CHAPTER 1

Force

2025

Q. 1. Choose the correct answer to the question from the given options. (Do not copy the question, write the correct answer only.)

(i) A body is acted upon by two equal and opposite forces, that are NOT along the same straight line. The body will : [1]

(a) remain stationary
(b) have only rotational motion
(c) have only rectilinear motion
(d) have both rectilinear and rotational motion

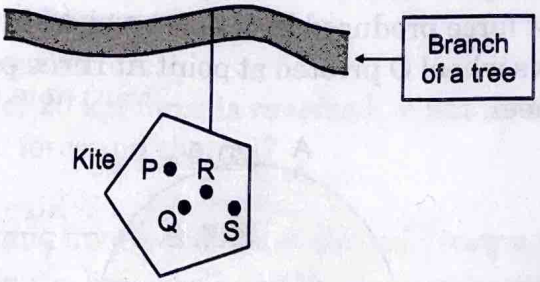
(ii) Which among the following is a vector quantity ? [1]

(a) work
(b) power
(c) energy
(d) moment of couple

Q. 2. (i) Complete the following by choosing the correct answer from the bracket :

(a) In uniform circular motion the centrifugal force acts _____ [1]
[towards the centre/away from the centre/along the tangential direction].

(ii) A non-uniform kite is hanging freely from the branch of a tree as shown. Study the figure and answer the following : [2]



(a) Fill in the blank :
_____ (P, Q, R or S) is the most probable position of its centre of gravity.

(b) Support your answer to (a) with a reason.

Q. 6. (i) Akash takes a uniform meter scale and suspends a weight of 2 N at one end 'X' and a weight of 5 N on the other end 'Y'. He then balances the ruler horizontally on a knife edge placed at 70 cm from X. Draw a diagram of the arrangement and calculate the weight of the ruler. [3]

2024

Q. 1. Choose the correct answer to the question from the given options. (Do not copy the question, write the correct answer only.)

(ii) A door lock is opened by turning the lever (handle) of length 0.2 m. If the moment of force produced is 1 Nm, then the minimum force required is : [1]

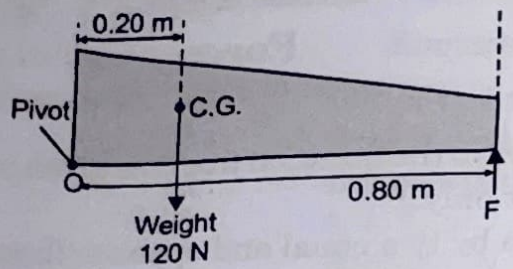
(a) 5 N
(b) 10 N
(c) 20 N
(d) 0.2 N

Q. 2. (ii) Fill in the blanks : [2

(a) When a stone tied to a string is rotated in a horizontal plane, the tension in the string provides _____ force necessary for circular motion.

(b) Work done by this force at any instant is _____ .

(iii) A non-uniform beam of weight 120 N pivoted at one end is shown in the diagram below. Calculate the value of F to keep the beam in equilibrium. [2



Q. 6. (i) (a) Define Centre of Gravity.

(b) A hollow ice cream cone has height 6 cm.

1. Where is the position of its centre of gravity from the broad base?
2. Will its position change when it is filled completely with honey? Write Yes or No. [3

2023

Q. 1. Choose the correct answer to the question from the given options. (Do not copy the question write the correct answer only.) [1

(i) Clockwise moment produced by a force about a fulcrum is considered to be :

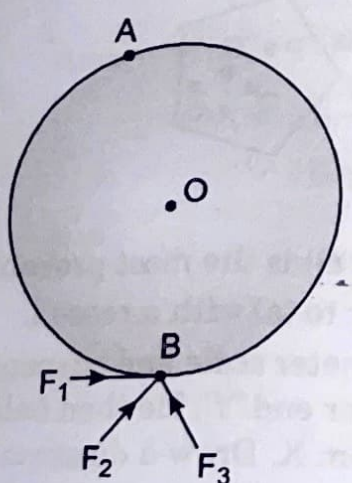
(a) Positive (b) Negative

(c) Zero (d) None of these.

Q. 2. (ii) (a) What is the position of centre of gravity of a triangular lamina ?

(b) When this triangular lamina is suspended freely from any one vertex, what is the moment of force produced by its own weight in its rest position ? [2

(iii) The diagram shows wheel O pivoted at point A. Three equal forces F_1, F_2 and F_3 act at point B on the wheel.

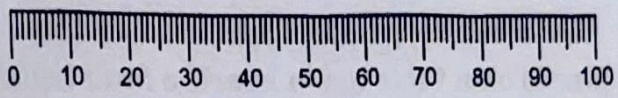


(a) Which force will produce maximum moment about A ?

(b) Give a reason for your answer in (a).

Q. 6. (ii) A metre scale of weight 50 gf can be balanced at 40cm mark without any weight suspended on it.

(a) If this ruler is cut at its centre then state which part [0 to 50 cm or 50 to 100 cm of the ruler will weigh more than 25 gf.



(b) What minimum weight placed on this metre ruler can balance this ruler when it is pivoted at its centre ?

2020

Q. 1. (a) (i) Define moment of force.

(ii) Write the relationship between the SI and CGS unit of moment of force. [2]

Q. 5. (b) (i) With reference to the direction of action, how does a centripetal force differ from a centrifugal force during uniform circular motion ?

(ii) Is centrifugal force the force of reaction of centripetal force ?

(iii) Compare the magnitudes of centripetal and centrifugal force. [3]

2019

Q. 1. (d) (i) Define couple.

(ii) State the S.I. unit of moment of couple. [2]

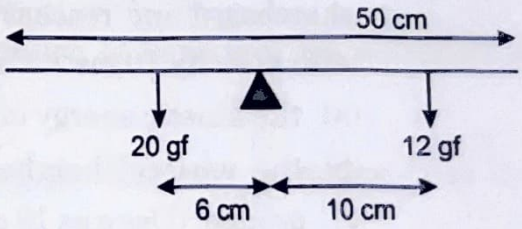
2018

Q. 1. (e) (i) Why is the motion of a body moving with a constant speed around a circular path said to be accelerated ?

(ii) Name the unit of physical quantity obtained by the formula $\frac{2K}{V^2}$.

Where K : kinetic energy, V : Linear velocity. [2]

Q. 5. (b) A half metre rod is pivoted at the centre with two weights of 20 gf and 12 gf suspended at a perpendicular distance of 6 cm and 10 cm from the pivot respectively as shown below. [3]



(i) Which of the two forces acting on the rigid rod causes clockwise moment?

(ii) Is the rod in equilibrium ?

(iii) The direction of 20 kgf force is reversed. What is the magnitude of the resultant moment of the forces on the rod?

2017

Q. 1. (a) A brass ball is hanging from a stiff cotton thread. Draw a neat labelled diagram showing the forces acting on the brass ball and the cotton thread. [2]

Q. 5. (a) A uniform half metre rule balances horizontally on a knife edge at 29 cm mark when a weight of 20 gf is suspended from one end. [3]

(i) Draw a diagram of the arrangement.

(ii) What is the weight of the half metre rule ?

(b) (ii) How does uniform circular motion differ from uniform linear motion ? [1]

2016

Q. 5. (a) A stone of mass 'm' is rotated in a circular path with a uniform speed by tying a strong string with the help of your hand. Answer the following questions :

(i) Is the stone moving with a uniform or variable speed ?

(ii) Is the stone moving with a uniform acceleration ? In which direction does the acceleration act ?

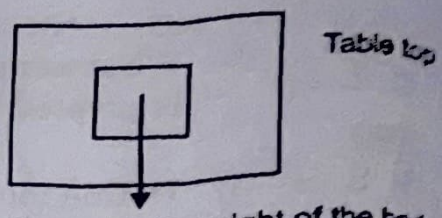
(iii) What kind of force acts on the hand and state its direction ? [3]

2013

Q. 1. (a) When a body is placed on a table top, it exerts a force equal to its weight downwards on the table top but does not move or fall.

(i) Name the force exerted by the table top.

(ii) What is the direction of the force ? [2]



(c) (iii) What is the S.I.unit of the moment of force ? [1]

(d) Name the factors affecting the turning effect of a body. [2]

CHAPTER 2

Work, Power and Energy

2023

Q. 1. Choose the correct answer to the question from the given options. (Do not copy the question, write the correct answer only.)

(iii) What is the correct energy transformation during burning of a candle ? [1]

(a) heat → kinetic + potential (b) heat → chemical + light

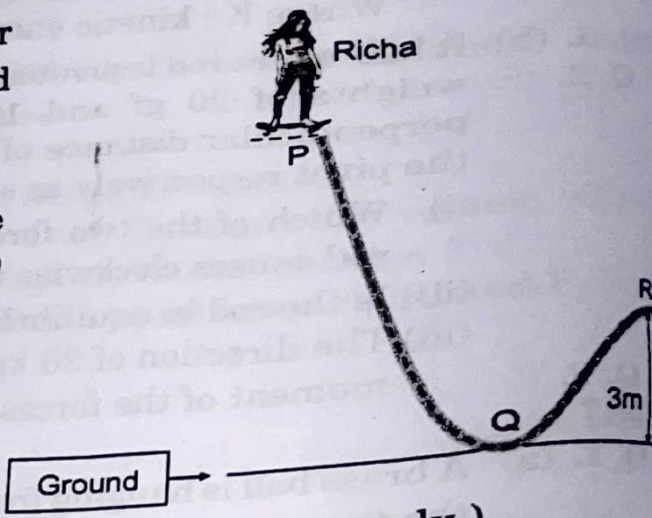
(c) chemical → heat + light (d) mechanical → chemical + heat

Q. 6. (iii) Richa weighing 40 kgf leaves point P on her skateboard and reaches point Q on the ground with velocity 10 ms^{-1}. Calculate : [4]

(a) the kinetic energy of Richa at point Q.

(b) the vertical height of point P above the ground. (Use g as 10 m/s^2 and neglect friction)

(c) the kinetic energy of Richa at point R. (While moving from Q to R, she loses 500 J of energy against friction.)



2024

Q. 1. Choose the correct answers to the questions from the given options. (Do not copy the questions, write the correct answers only.)

(i) When a bell fixed on a cycle rings, then the energy conversion that takes place is : [1]

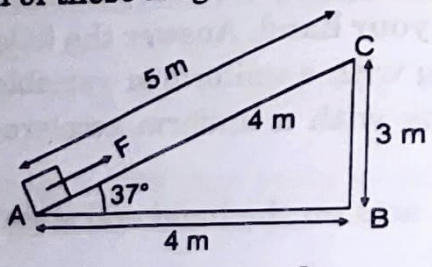
(a) gravitational potential energy to sound energy

(b) kinetic energy to sound energy

(c) sound energy to electrical energy

(d) sound energy to mechanical energy

(iii) A force 'F' moves a load from A to C as shown in the figure below. For the calculation of the work done, which of these lengths would you use as the displacement? [1]



(a) 3m (b) 4m

(c) 5m (d) 7m

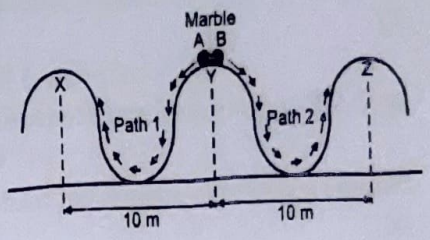
Q. 2. (v) Sumit does 600 J of work in 10 min and Amit does 300 J of work in 20 min. Calculate the ratio of the powers delivered by them. [2]

Q. 6. (ii) Two identical marbles A and B are rolled down along Path 1 and Path 2 respectively. Path 1 is frictionless and Path 2 is rough. [3]

(a) Which marble will surely reach the next peak?

(b) Along which path/s the mechanical energy will be conserved?

(c) Along which path/s is the law of conser-vation of energy obeyed?



2023

Q. 1. Choose the correct answers to the questions from the given options. (Do not copy the questions, write the correct answers only.)

(ii) When the speed of a moving object is doubled, then its kinetic energy : [1]

(a) remains the same (b) decreases

(c) is doubled (d) becomes four times.

(iii) The energy conversion in a washing machine is from..... [1]

(a) magnetic to electrical (b) electrical to mechanical

(c) electrical to magnetic (d) magnetic to electrical

Q. 2. (iv) (a) What should be the angle between the direction of force and the direction of displacement, for work to be negative ?

(b) Name the physical quantity obtained using the formula $\frac{U}{h}$, where U is the potential energy and h is the height. [2]

(v) Calculate the power spent by a crane while lifting a load of mass 2000 kg, at velocity of 1.5 ms^{-1}. ($g = 10\ ms^{-2}$) [2]

Q. 6. (iii) A car of mass 120 kg is moving at a speed 18 km/h and it accelerates to attain a speed of 54 km/h in 5 seconds. Calculate : [4]

(a) the work done by the engine.

(b) the power of the engine.

2020

Q. 1. (c) A satellite revolves around a planet in a circular orbit. What is the work done by the satellite at any instant ? Give a reason. [2]

(e) Give one example of each when : [2]

(i) Chemical energy changes into electrical energy.

(ii) Electrical energy changes into sound energy.

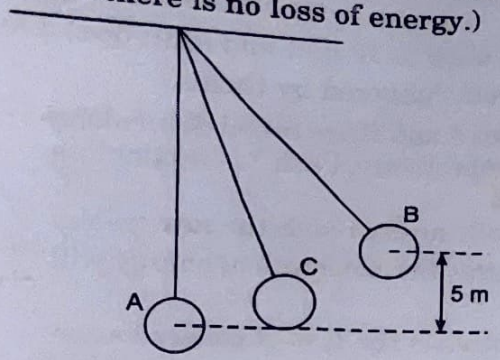
Q. 2. (a) A crane 'A' lifts a heavy load in 5 seconds, whereas another crane 'B' does the same work in 2 seconds. Compare the power of crane 'A' to that of crane 'B'. [2]

Q. 5. (a) The figure below shows a simple pendulum of mass 200 g. It is displaced from the mean position A to the extreme position B. The potential energy at the position A is zero. At the position B the pendulum bob is raised by 5 m. [3]

(i) What is the potential energy of the pendulum at the position B ?

(ii) What is the total mechanical energy at point C ?

(iii) What is the speed of the bob at the position A when released from B ? (Take g = 10 ms^{-2} and there is no loss of energy.)



2019

Q. 1. (b) Two bodies A and B have masses in the ratio 5 : 1 and their kinetic energies are in the ratio 125 : 9. Find the ratio of their velocities. [2]

Q. 5. (a) A body of mass 10 Kg is kept at a height of 5 m. It is allowed to fall and reach the ground.

(i) What is the total mechanical energy possessed by the body at the height of 2 m assuming it is a frictionless medium ?

(ii) What is the kinetic energy possessed by the body just before hitting the ground? Take g = 10 m/s^2. [3]

2018

Q. 1. (a) (i) State and define the S.I. unit of power.

(ii) How is the unit horse power related to the S.I. unit of power ? [2]

(b) State the energy changes in the following cases while in use : [2]

(i) An electric iron.

(ii) A ceiling fan.

Q. 5. (a) (i) Derive a relationship between S.I. and C.G.S. unit of work.

(ii) A force acts on a body and displaces it by a distance S in a direction at an angle θ with the direction of force. What should be the value of θ to get the maximum positive work? [3]

2017

Q. 1. (d) If the power of a motor be 100 KW, at what speed can it raise a load of 50,000 N ? [2]

Q. 3. (d) How is the frequency of a stretched string related to : [2]

(i) its length ?

(ii) its tension ?

2016

Q. 1. (b) A boy weighing 40kgf climbs up a stair of 30 steps each 20 cm high in 4 minute and a girl weighing 30kgf does the same in 3 minutes. Compare :

(i) The work done by them.

(ii) The power developed by them. [2]

Q. 3. (a) State two ways by which the frequency of transverse vibrations of a stretched string can be increased. [2]

2015

Q. 1. (c) (i) On what factor does the position of the centre of gravity of a body depend ? [1]

Q. 2. (a) How is work done by a force measured when the force :

(i) is in the direction of displacement

(ii) is at an angle to the direction of displacement. [2]

(b) State the energy changes in the following while in use : [2]
(i) Burning of a candle.
(ii) A steam engine.
(d) Explain the motion of a planet around the sun in a circular path. [2]
(e) Rajan exerts a force of 150 N in pulling a cart at a constant speed of 10 m/s. Calculate the power exerted. [2]

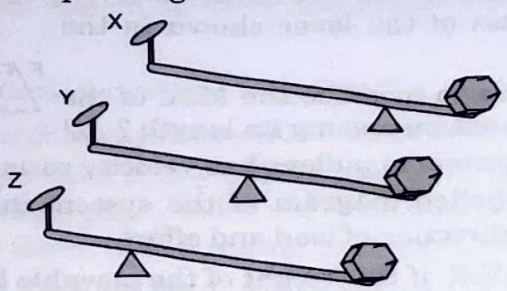
Q. 5. (b) (i) Name the physical quantity measured in terms of horse power.
(ii) A nut is opened by a wrench of length 20cm. If the least force required is 2N, find the moment of force needed to loosen the nut.
(iii) Explain briefly why the work done by a fielder when he takes a catch in a cricket match is negative. [4]

CHAPTER 3
Simple Machines

2025

Q. 1. Choose the correct answer to the question from the given options. (Do not copy the question, write the correct answer only.)
(vi) For a lever, a graph is plotted with load on Y-axis and effort on X-axis. Which of the following represents the slope of the graph ? [1]
(a) Mechanical advantage (b) Velocity ratio
(c) 1/Velocity ratio (d) 1/Mechanical advantage

Q. 6. (ii) Three levers X, Y, Z of equal lengths are shown in the diagram. [3]



(a) Which class of lever do these belong to ?
(b) Among these (X, Y or Z) which one will give the maximum mechanical advantage ? Justify your answer.

Q. 7. (i) Draw a block and tackle system of pulleys with velocity ratio equal to 3. [3]

2024

Q. 1. Choose the correct answer to the question from the given options. (Do not copy the question, write the correct answer only.)
(vii) Which of the following is a class III lever? [1]
(a) Pair of scissors (b) Wheelbarrow
(c) Crowbar (d) Human forearm

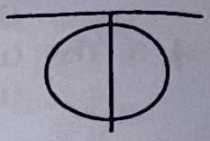
Q. 2. (i) (b) Name the class of the lever shown in the picture below : [1½]

(iv) Meera chose to use a block and tackle system of '9' pulleys instead of a single movable pulley to lift a heavy load. [2]

(a) What is the advantage of using a block and tackle system over a single movable pulley?

(b) Why should she connect more number of pulleys in the upper fixed block?

Q. 6. (iii) Given are two pulleys.



(a) Copy and complete the labelled diagram connecting the two pulleys with a tackle to obtain Velocity Ratio = 2.

(b) If Load = 48 kgf and efficiency is 80% then calculate :

1. Mechanical Advantage.

2. Effort needed to lift the load. [4]

2023

Q. 2. (i) (b) Name a single pulley in which displacement of load and effort is not the same.

(c) State one advantage of this pulley. [2]

Q. 6. (i) A block and tackle system of pulleys has velocity ratio 4. [3]

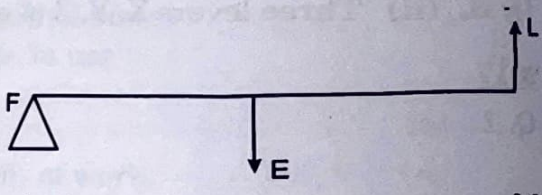
(a) Draw a labelled diagram of the system indicating clearly, the direction of the load and the effort.

(b) What is the value of the mechanical advantage of the given pulley system if it is an ideal pulley system ?

2020

Q. 1. (d) (i) Identify the class of the lever shown in the diagram.

(ii) How is it possible to increase the M.A. of the above lever without increasing its length ? [2]



Q. 5. (c) A block and tackle system of pulleys has velocity ratio 4. [4]

(i) Draw a neat labelled diagram of the system indicating clearly the points of application and direction of load and effort.

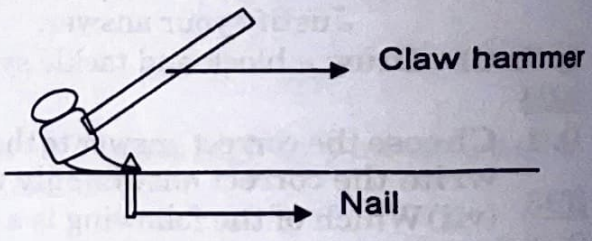
(ii) What will be its V.R. if the weight of the movable block is doubled ?

2019

Q. 1. (a) The diagram alongside shows a claw hammer used to remove a nail : [2]

(i) To which class of lever does it belong ?

(ii) Give one more example of the same class of lever mentioned by you in (i) for which the mechanical advantage is greater than one.



Q. 5. (b) A uniform meter scale is in equilibrium as shown in the diagram : [3]

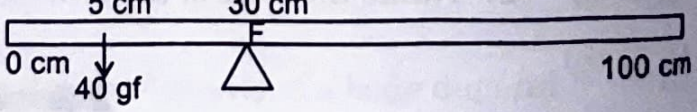
(i) Calculate the weight of the meter scale.

(ii) Which of the following options is correct to keep the ruler in equilibrium when 40 gf wt is shifted to 0 cm mark ?

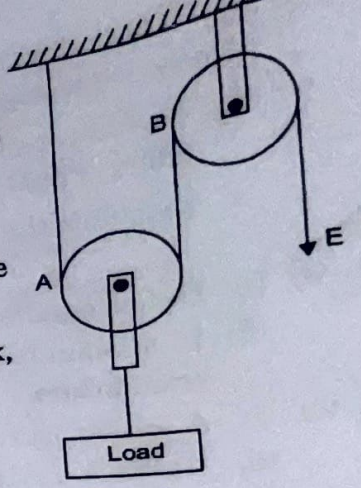
F is shifted towards 0 cm.

or

F is shifted towards 100 cm.



(c) The diagram below shows a pulley arrangement : [4]



(i) Copy the diagram and mark the direction of tension on each strand of the string.

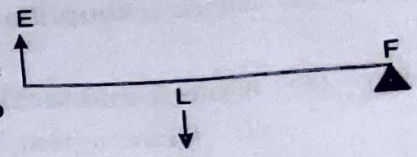
(ii) What is the velocity ratio of the arrangement?

(iii) If the tension acting on the string is T, then what is the relationship between T and effort E?

(iv) If the free end of the string moves through a distance x, find the distance by which the load is raised.

2018

Q. 1. (c) The diagram below shows a lever in use : [2]



(i) To which class of levers does it belong ?

(ii) Without changing the dimensions of the lever, if the load is shifted towards the fulcrum what happens to the mechanical advantages of the lever ?

Q. 5. (c) (i) Draw a diagram to show a block and tackle pulley system having a velocity ratio of 3 marking the direction of load(L), effort(E) and tension(T).

(ii) The pulley system drawn lifts a load of 150 N when an effort of 60 N is applied. Find its mechanical advantages.

(iii) Is the above pulley system an ideal machine or not? [4]

2017

Q. 1. (c) Why is a jack screw provided with a long arm ? [2]

(e) Which class of lever will always have MA > 1 and why ? [2]

Q. 5. (b) (i) A boy uses a single fixed pulley to lift a load of 50 kgf to some height. Another boy uses a single movable pulley to lift the same load to the same height. Compare the effort applied by them. Give a reason to support your answer. [1]

(c) A pulley system with VR = 4 is used to lift a load of 175 kgf through a vertical height of 15m. The effort required is 50 kgf in the downward direction. ($g = 10\ N\ kg^{-1}$) [4]

Calculate :

(i) Distance moved by the effort.

(ii) Work done by the effort.

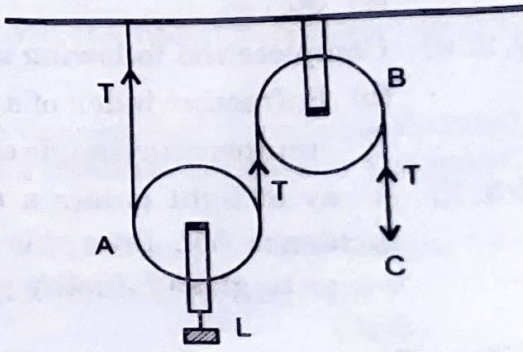
(iii) M.A. of the pulley system.

(iv) Efficiency of the pulley system.

2016

Q. 1. (c) With reference to the terms Mechanical Advantage, Velocity Ratio and efficiency of a machine, name and define the term that will not change for a machine of a given design. [2]

Q. 5. (b) From the diagram alongside, answer the questions that follow : [3]



(i) What kind of pulleys are A and B ?

(ii) State the purpose of pulley B.

(iii) What effort has to be applied at C to just raise the load L = 20 kgf ?
(Neglect the weight of pulley A and friction).

(c) (ii) A pulley system has three pulleys. A load of 120N is overcome by applying an effort of 50N.
Calculate the Mechanical Advantage and Efficiency of this system. [4]

2015

Q. 1. (e) (i) Define equilibrium.
(ii) In a beam balance when the beam is balanced in a horizontal position, it is in equilibrium. [2]

Q. 2. (c) (i) A scissor is a ..... multiplier.
(ii) 1 kWh = ... J. [2]

Q. 5. (a) Draw a simplified diagram of a lemon crusher, indicating direction of load and effort. [2]

(c) A block and tackle system has V.R. = 5.
(i) Draw a neat labelled diagram of a system indicating the direction of its load and effort.
(ii) Rohan exerts a pull of 150 Kgf. What is the maximum load he can raise with this pulley system if its efficiency = 75%?

CHAPTER 4

Refraction of Light at Plane Surfaces

2025

Q. 1. Choose the correct answer to the question from the given options. (Do not copy the question, write the correct answer only.)

(iv) When a ray of light passes from one optical medium to another, which of the following physical quantities does Not change ?

(a) Amplitude of the wave (b) Frequency of the wave
(c) Wavelength of the wave (d) Speed of the wave

(viii) A ray of light is incident normally on a face of an equilateral prism. The ray gets totally reflected at the second refracting surface. The total deviation produced in the path of the ray is :

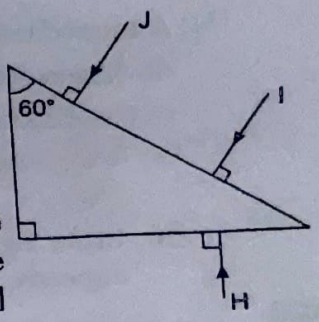
(a) 30° (b) 60°
(c) 90° (d) 120°

Q. 2. (i) Complete the following by choosing the correct answer from the bracket :

(b) Refractive index of a medium is independent of _____
[temperature/angle of incidence/wave-length of light].

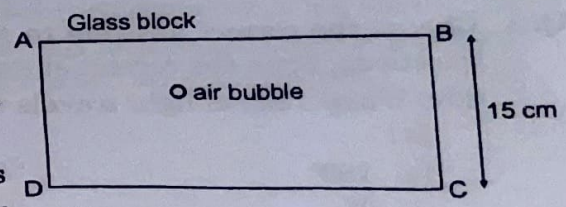
Q. 3. (i) A ray of light enters a rectangular glass slab submerged in water at an angle of incidence 55°. Does this ray undergo total internal reflection when it moves from water to glass ? Justify your answer. (The critical angle for glass-water interface is 54°.)

Q. 4. (i) (a) Out of the three rays (I, J, H) shown in the diagram, which ray will suffer Total Internal Reflection while inside the prism ? (Critical angle of the prism is 42°.)



(b) Copy the diagram to complete the path of the ray which you have named in (a) till it comes out of the prism. [3]

(ii) A rectangular glass block of refractive index 1.5 has an air bubble trapped inside it as shown in the diagram. When seen from the surface AB, it appears to be 4 cm deep. [3]

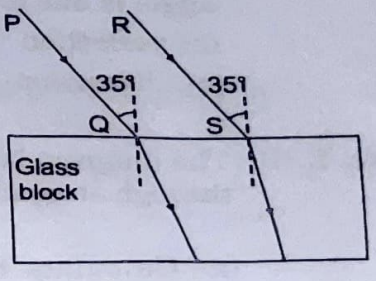


(a) Calculate the actual depth of the air bubble from the surface AB.

(b) For which colour of light, blue or yellow, the apparent depth will be greater ?

(c) Turning the glass block upside down, Does Not change the apparent depth of the air bubble. State True or False.

Q. 5. (ii) Two rays PQ and RS are incident on a rectan-gular glass block as shown in the diagram. Observe the diagram and answer the questions that follow : [3]



Which of these two rays will :

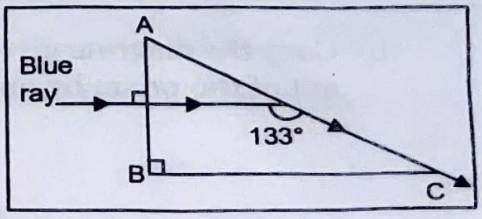
(a) have greater lateral displacement on emerging out of the block ?

(b) travel with greater speed in the block ?

(c) scatter more in the atmosphere ?

2024

Q. 4. (iii) (b) The diagram below shows the path of a blue ray through the prism : [2]



1. Calculate the critical angle of the material of the prism for blue colour.
2. What is the measure of the angle of this prism (A)?
3. Which colour should replace the blue ray, for the ray to undergo Total Internal Reflection?

Q. 5. (i) (a) Refractive index of glass with respect to water is $\frac{9}{8}$.

Find the refractive index of water with respect to glass.

(b) Name the principle used to find the value in part (a).

(c) If we change the temperature of water, then will the ratio $\frac{9}{8}$ remain the same?

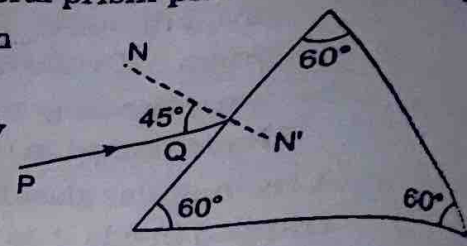
Write Yes or No. [3]

(ii) Light travels a distance of '10x' units in time 't_1' in vacuum and it travels a distance o 'x' units in time 't_2' in a denser medium. Using this information answer the questio that follows : [3]

(a) Light covers a distance of '20x' units in time 't_1' in diamond. State true or false.

(b) Calculate the refractive index of the medium in terms of 't_1' and 't_2'.

(iii) A monochromatic ray of light is incident on an equilateral prism placed at minimu deviation position with an angle of incidence 45° as shown in the diagram. [4]



(a) Copy the diagram and complete the path of the ray PQ.

(b) State two factors on which the angle of deviation depends.

2023

Q. 1. Choose the correct answers to the questions from the given options. (Do not copy the questions, write the correct answers only.)

(xiv) When a ray of light travels normal to the given surface, then the angle of refraction is : [1]

(a) 180° (b) 90°

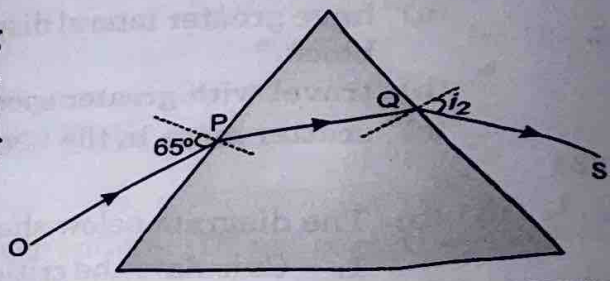
(c) 0° (d) 45°

(xv) Small air bubbles rising up a fish tank appear silvery when viewed from some particular angle is due to the : [1]

(a) reflection (b) refraction

(c) dispersion (d) total internal reflection

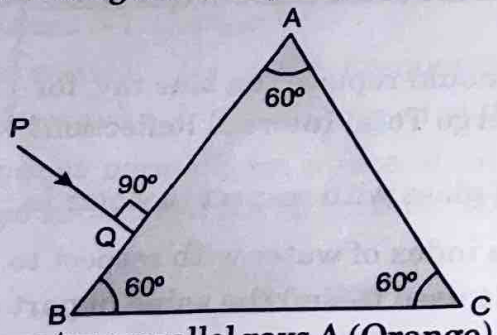
Q. 4. (i) The diagram below shows the ray OP travelling through an equilateral prism of a certain material. [3]



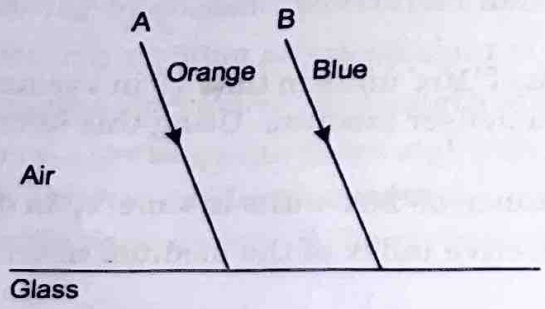
(a) Calculate the value of i_2, if the angle of deviation is 43°.

(b) What is the ray QS called ?

(ii) Copy the diagram given below and complete the path of the light ray PQ, as it emerges out of the prism by marking necessary angles. The critical angle of glass is 42°. [3]



(iii) The diagram below shows two parallel rays A (Orange) & B (Blue) incident from air, on air-glass boundary. [4]



(a) Copy and complete the path of the rays A and B.
(b) How do the speeds of these rays differ in glass ?
(c) Are the two refracted rays in glass parallel ? Give a reason.

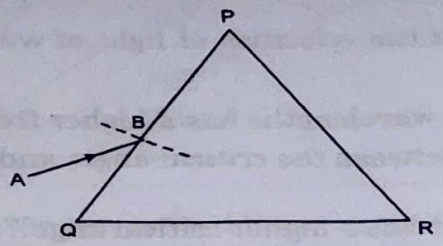
Q. 5. (ii) (a) A coin kept inside water [μ = 4/3] when viewed from air in a vertical direction appears to be raised by 3.0 mm. Find the depth of the coin in water.

(b) How is the critical angle related to the refractive index of a medium ? [3]

2020

Q. 2. (b) A ray of light falls normally on a rectangular glass slab.
Draw a ray diagram showing the path of the ray till it emerges out of the slab. [2]

(c) Complete the path of the monochromatic light ray AB incident on the surface PQ of the equilateral glass PQR till it emerges out of the prism due to refraction. [2]

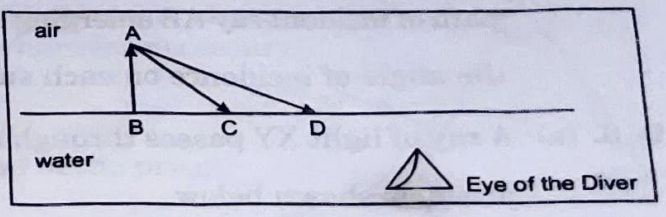


(e) A pond appears to be 2.7 m deep. If the refractive index of water is $\frac{4}{3}$, find the actual depth of the pond. [2]

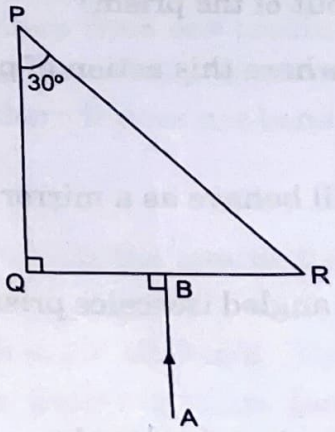
Q. 6. (a) A diver in water looks obliquely at an object AB in air. [3]

(i) Does the object appear taller, shorter or of the same size to the diver ?

(ii) Show the path of two rays AC and AD starting from the tip of the object as it travels towards the diver in water and hence obtain the image of the object.



(b) Complete the path of the ray AB through the glass prism in PQR till it emerges out of the prism. Given the critical angle of the glass as 42°. [3]



2019

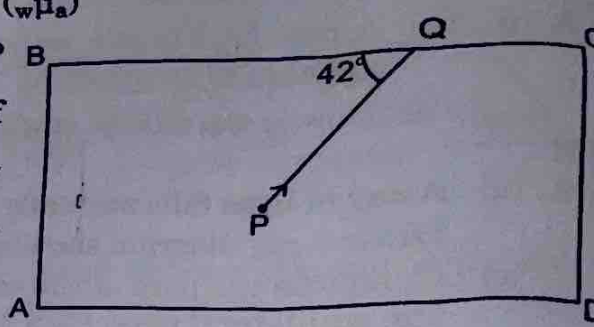
Q. 1. (e) (i) Define critical angle.

(ii) State one important factor which affects the critical angle of a given medium

Q. 2. (b) (i) What is the relation between the refractive index of water with respect to air (and the refractive index of air with respect to water ($_w\mu_a$).

(ii) If the refreactive index of water with respect to air (${}_a\mu_w$) is $\frac{5}{3}$. Calculate th
refractive index of air with respect to water (${}_w\mu_a$) [

(e) The diagam below shows a light source P embedded in a rectangular glass block ABCD of critical angle 42°. Complete the path of the ray PQ till it emerges out of the block. [Write necessary angles.] [2]



2018

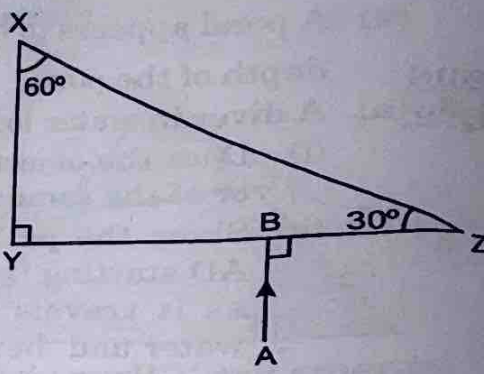
Q. 1. (d) (i) Why is the ratio of the velocities of light of wavelengths 4000 Å and 8000Å i
vacuum 1 : 1?

(ii) Which of the above wavelengths has a higher frequency ? [2

Q. 2. (c) (i) State the relation between the critical angle and the absolute refractive index o
a medium.

(ii) Which colour of light has a higher critical angel? Red light or Green light. [2

(e) The following diagram shows a 60°, 30°, 90° glass prism of critical angle 42°. Copy the diagram and complete the path of incident ray AB emerging out of the prism marking the angle of incidence on each surface. [2]

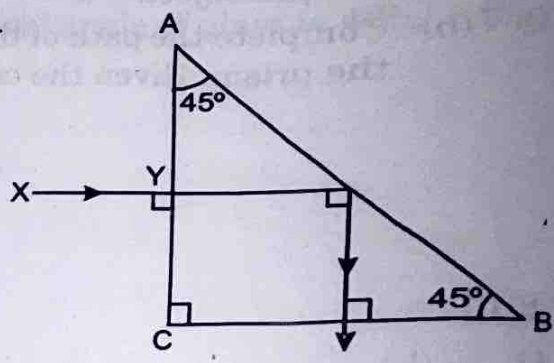


Q. 6. (a) A ray of light XY passes through a right angled isosceles prism as shown below. [3]

(i) What is the angle through which the incident ray deviates and emerges out of the prism?

(ii) Name the instrument where this action of prism is put into use.

(iii) Which prism surface will behave as a mirror ?



Q. 7. (a) Draw the diagram of a right angled isosceles prism which is used to make an inverted image erect. [3]

017

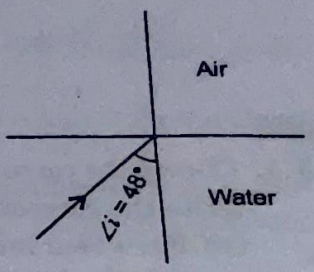
. 2. (d) How is refractive index of a material related to : [2]

(i) Real and apparent depth ?

(ii) Velocity of light in vacuum or air and the velocity of light in a given medium ?

(e) State the conditions required for total internal reflection of light to take place. [2]

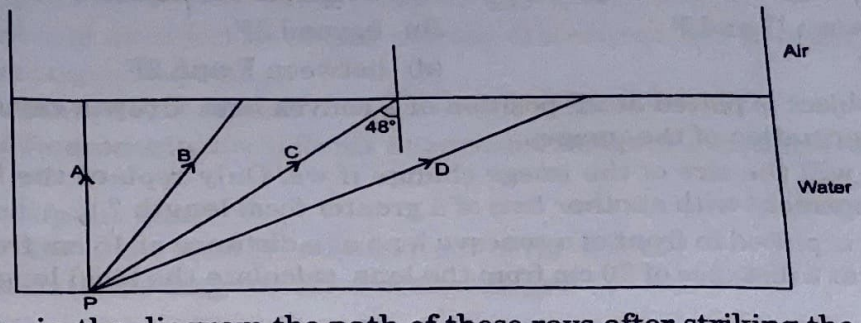
Q. 7. (b) A ray of light travels from water to air as shown in the diagram given below : [3]



(i) Copy the diagram and complete the path of the ray. Given the critical angle for water is 48°.

(ii) State the condition so that total internal reflection occurs in the above diagram.

(c) The diagram below shows a point source P inside a water container. Four rays A, B, C, D starting from the source P are shown upto the water surface. [4]

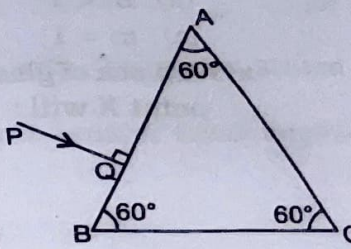


(i) Show in the diagram the path of these rays after striking the water surface. The Critical Angle for the water air surface is 48°.

(ii) Name the phenomenon which the rays B and D exhibit.

2016

Q. 2. (c) Copy the diagram given below and complete the path of light ray till it emerges out of the prism. The critical angle of glass is 42°. In your diagram mark the angles wherever necessary. [2]



(d) State the dependence of angle of deviation :

(i) On the refractive index of the material of the prism.

(ii) On the wavelength of light. [2]

Q. 7. (a) (i) Write a relationship between angle of incidence and angle of refraction for given pair of media.

(ii) When a ray of light enters from one medium to another having different optic densities it bends. Why does this phenomenon occur ?

(iii) Write one condition where it does not bend when entering a medium of differe optical density.

2015

Q. 1. (b) (i) Name one factor that affects the lateral displacement of light as it passes thro a rectangular glass slab.

Q. 3. (b) The speed of light in glass is 2×10^5 km/s. What is the refractive index of glass ?

Q. 6. (c) Jatin puts a pencil into a glass container having water and is surprised to see pencil in a different state.

(i) What change is observed in the appearance of the pencil ?

(ii) Name the phenomenon responsible for the change.

(iii) Draw a ray diagram showing how the eye sees the pencil.

CHAPTER 5

Refraction Through A Lens

2025

Q. 1. Choose the correct answer to the question from the given options. (Do not copy the question, write the correct answer only.)

(vii) For a real image formed by a convex lens, the ratio of I : O = 2 : 5, then the object is: (I is the height of the image and O is the height of the object) : [1]

(a) between O and F (b) beyond 2F

(c) at F (d) between F and 2F

Q. 4. (iii) (a) An object is placed at 2F position of a convex lens. Draw a ray diagram showing the formation of the image.

(b) How will the size of the image change if we, Only replace the lens in the above arrangement with another lens of a greater focal length ? [4]

Q. 5. (i) An object is placed in front of a concave lens at a distance of 45 cm from it. If its image is formed at a distance of 30 cm from the lens, calculate the focal length of the lens. [3]

2024

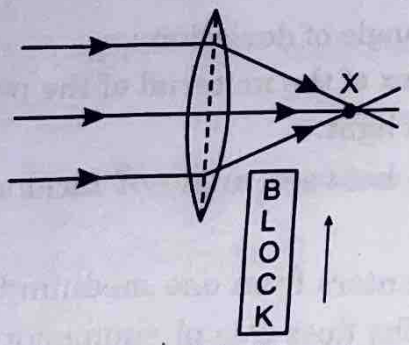
Q. 1. Choose the correct answers to the questions from the given options. (Do not copy the questions, write the correct answers only.)

(xii) Linear magnification (m) produced by a concave lens is : [1]

(a) $m < 1$ (b) $m > 1$

(c) $m = 1$ (d) $m = 2$

(xv) A block of glass is pushed into the path of the light as shown below. Then the converging point X will : [1]



(a) Move away from the slab (b) Move towards the slab

(c) Not shift (d) Move towards the left side of the lens

Q. 3. (i) (a) In a reading glass what is the position of the object with respect to the convex lens used?

(b) Why can we not use concave lens for the same purpose? [2]

Q. 4. (i) The image of a candle flame placed at a distance of 36 cm from a spherical lens, is formed on a screen placed at a distance of 72 cm from the lens. Calculate the focal length of the lens and its power. [3]

2023

1. Choose the correct answer to the question from the given options. (Do not copy the question write the correct answer only.)

(vi) A concave lens produces only..... image. [1]

(a) real, enlarged (b) virtual, enlarged

(c) virtual, diminished (d) real, diminished

Q. 3. (i) (a) Is it possible for a concave lens to form an image of size two times that of the object ? Write Yes or No.

(b) What will happen to the focal length of the lens if a part of the lens is covered with an opaque paper ? [2]

Q. 5. (i) A convex lens of focal length 10 cm is placed at a distance of 60 cm from a screen. How far from the lens should an object be placed so as to obtain a real image on the screen? [3]

2020

Q. 2. (d) Where should an object be placed in front of a convex lens in order to get : [2]

(i) an enlarged real image

(ii) enlarged virtual image ?

Q. 6. (c) A lens of focal length 20 cm forms an inverted image at a distance 60 cm from the lens. [4]

(i) Identify the lens.

(ii) How far is the lens present in front of the object ?

(iii) Calculate the magnification of the image.

2019

Q. 3. (a) (i) If the lens is placed in water instead of air, how does its focal length change?

(ii) Which lens, thick or thin has greater focal length? [2]

Q. 6. (b) A virtual, diminished image is formed when an object is placed between the optical centre and the principal focus of a lens. [3]

(i) Name the type of lens which forms the above image.

(ii) Draw a ray diagram to show the formation of the image with the above stated characteristics.

(c) An object is placed at a distance of 24 cm in front of a convex lens of focal lengt 8 cm.

(i) What is the nature of the image so formed?

(ii) Calculate the distance of the image from the lens.

(iii) Calculate the magnification of the image.

2018

Q. 2. (a) The power of a lens is –5D.

(i) Find its focal length.

(ii) Name the type of lens.

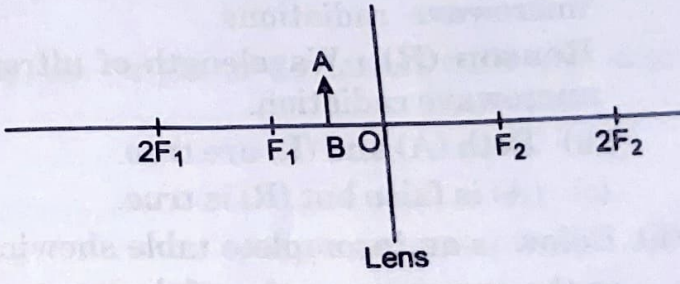
(b) State the position of the object in front of a converging lens if :

(i) It produces a real and same size image of the object.

(ii) It is used as a magnifying lens.

Q. 6. (b) An object AB is placed between O and F_1 on the principal axis of a converging lens as shown in the diagram. [3]

Copy the diagram and by using the standard rays starting from point A, obtain an image of the object AB.



(c) An object is placed at a distance of 12 cm from a convex lens of focal length 8 cm

(i) the position of the image

(ii) nature of the image

2017

Q. 7. (a) A Lens forms an upright diminished image of an object when the object is placed at t
focal point of the given lens.
(i) Name the lens.
(ii) Draw a ray diagram to show the image formation.

2016

Q. 7. (b) A lens produces a virtual image between the object and the lens.
(i) Name the lens.
(ii) Draw a ray diagram to show the formation of this image.

2015

Q. 6. (a) (i) Where should an object be placed so that a real and inverted image of the sam
size as the object is obtained using a convex lens ?
(ii) Draw a ray diagram to show the formation of the image as specified in the part
(i).

CHAPTER 6

Spectrum

2025

Q. 1. Choose the correct answer to the question from the given options. (Do not copy the questio
write the correct answer only.)

(v) Which one of the following combinations is the correct ascending order of electr
magnetic waves in terms of wavelength ?
(a) gamma-rays, visible light, microwaves
(b) microwaves, visible light, gamma-rays
(c) gamma-rays, microwaves, visible light
(d) microwaves, gamma-rays, visible light

Q. 5. (iii) (a) Name the radiations :
1. for which a quartz prism is used to study the spectrum.
2. which are used in remote sensing devices.
3. which are used in traffic signals in India.

(b) Name one property common to all electro-magnetic radiations.

2024

Q. 1. Choose the correct answer to the question from the given options. (Do not copy the questio
write the correct answer only.)

(v) **Assertion (A) :** Ultraviolet radiations are scattered more as compared to t
microwave radiations.
Reason (R) : Wavelength of ultraviolet radiation is more than the wavelength
microwave radiation.
(a) Both (A) and (R) are true.
(b) (A) is true but (R) is false.
(c) (A) is false but (R) is true.
(d) Both (A) and (R) are false.

Q. 4. (ii) Below is an incomplete table showing the arrangement of electromagnetic spectru
in the increasing order of their wavelength. Complete the table.

Gamma ray	X-ray	UV rays	Visible rays	Infrared	A	Radio waves

(a) Identify the radiation A.

(b) Name the radiation used to detect fracture in bones.

(c) Name one property common to both A and radio waves.

(iii) (a) Why do we use red colour as a danger signal on the top of a skyscraper? [2]

2023

Q. 1. Choose the correct answers to the questions from the given options. (Do not copy the questions, write the correct answers only.)

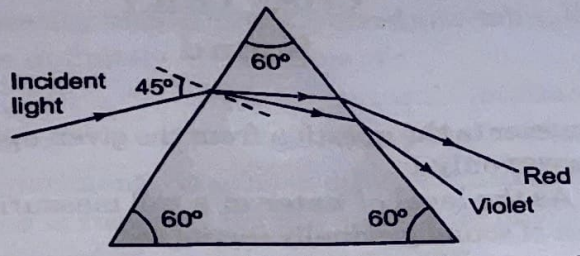
(v) Speed of blue light in water is : [1]

(a) more than green light (b) more than orange light

(c) more than violet light (d) more than red light

Q. 5. (iii) (a) Infrared radiations are used in warface. Explain with reason, why.

(b) A ray of light is incident at 45° on an equilateral prism in the diagram below. [4]



(1) Name the phenomenon exhibited by the ray of light when it enters and emerges out of the prism.

(2) State the cause of the above phenomenon mentioned by you.

2020

Q. 3. (a) The wave length for the light of red and blue colours are nearly 7.8×10^{-7} m and 4.8×10^{-7} m respectively. [2]

(i) Which colour has the greater speed in a vaccum ?

(ii) Which colour has a greater speed in glass ?

Q. 7. (a) Give reasons for the following :

During the day :

(i) Clouds appear white.

(ii) Sky appears blue.

2019

Q. 6. (a) How does the angle of deviation formed by a prism change with the increase in angle of incidence ?

Draw a graph showing the variation in the angle of deviation with the ang incidence at a prism surface.

2018

Q. 2. (d) (i) Define scattering.

(ii) The smoke from a fire looks white.

Which of the following statements is true?

(1) Molecules of the smoke are bigger than the wavelength of light.

(2) Molecules of the smoke are smaller than the wavelength of light.

Q. 3. (a) Draw a ray diagram to show the refraction of a monochromatic ray through a prism when it suffers minimum deviation. [2]

2016

Q. 2. (b) A boy uses blue colour of light to find the refractive index of glass. He then repeats the experiment using red colour of light. Will the refractive index be the same or different in the two cases ? Give a reason to support your answer. [2]

Q. 7. (c) What do you understand by the term 'Scattering of light' ? Which colour of white light is scattered the least and why ? [4]

2015

Q. 6. (b) (i) Why does the Sun appear red at sunrise ?

(ii) Name the subjective property of light related to its wavelength. [3]

CHAPTER 7

Sound

2025

Q. 1. Choose the correct answer to the question from the given options. (Do not copy the question write the correct answer only.)

(xi) **Assertion (A) :** As the level of water in a tall measuring cylinder kept under running tap rises, the pitch of sound gradually increases.

Reason (R) : Frequency of sound is inversly proportional to the length of the water column. [1]

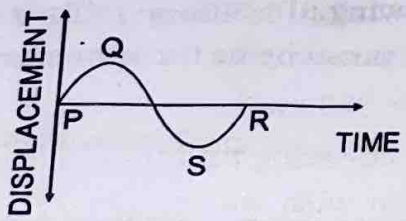
(a) Both (A) and (R) are true and (R) is correct explanation of (A).

(b) Both (A) and (R) are true and (R) is not the correct explanation of (A).

(c) (A) is true but (R) is false.

(d) (A) is false but (R) is true.

Q. 2. (iii) The displacement-time graph of a sound wave produced by a vibrating wire is shown below. [2]

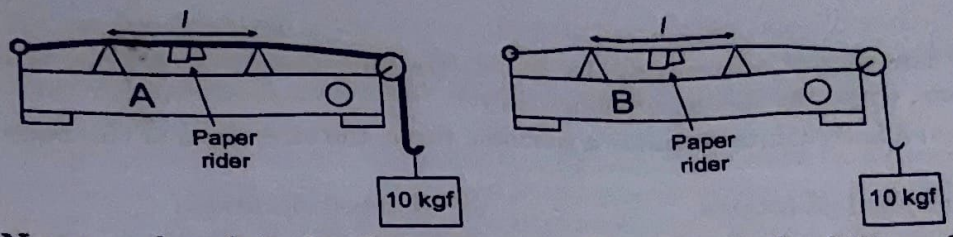


(a) How will you adjust the tension in the wire, to reduce the length of PR ?

(b) Which characteristic of sound is affected by the reduction in the length of PR ?

Q. 7. (ii) A submarine in the sea, sends ultrasonic ping and a stopwatch is started simultaneously. The stopwatch stops on receiving the reflected wave from an obstacle and reads 1 minute 40 seconds. Calculate the distance of the obstacle from the submarine. (Speed of sound in water 1500 ms^{-1}.) [3]

(iii) The diagrams given below show two sound boxes A and B with wires of same length and tension (10 kgf) but different cross-sectional areas. Simultaneously, vibrating tuning forks of frequency 300 Hz are placed on the boxes A and B. The paper rider falls off in case of B but not in case of A. [4]



(a) Name and explain the phenomenon responsible for the falling off of the paper rider in B.

(b) The wire A resonates with a tuning fork of frequency 'f'. Is 'f' greater than, less than or equal to 300 Hz ? Justify your answer.

2024

Q. 1. Choose the correct answer to the question from the given options. (Do not copy the question, write the correct answer only.)

(vi) When the stem of vibrating tuning fork is pressed on a table, the tabletop starts vibrating. These vibrations are definitely an example of : [1]

(a) resonance (b) natural vibrations

(c) forced vibrations (d) damped vibrations

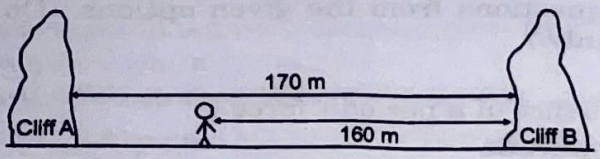
Q. 2. (vii) Rohan conducted experiments on echo in different media. He observed that a minimum distance of 'x' metres is required for the echo to be heard in oxygen and 'y' metres in benzene. Compare 'x' and 'y'. Justify your answer. [2]

Speed of sound in oxygen : 340 ms^{-1}.

Speed of sound in benzene : 200 ms^{-1}.

Q. 7. (i) (a) Name the waves used in SONAR.

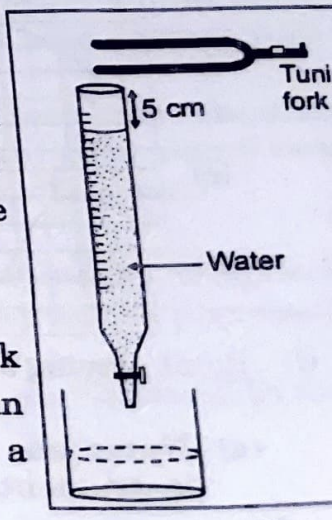
(b)



In the above diagram Lata stands between two cliffs and claps her hand Determine the time taken by her to hear the first echo.

Speed of sound in air 320 ms^{-1}.

(iii) In the given diagram, a vibrating tuning fork is kept near the mouth of a burette filled with water. The length of the air column is adjusted by opening the tap of the burette. At a length of 5 cm of the air column, a loud sound is heard. [4]



(a) Name the phenomenon illustrated by the above experiment.

(b) Why is a loud sound heard at this particular length?

(c) If the present tuning fork is replaced with a tuning fork of higher frequency, should the length of the air column increase or decrease to produce a loud sound? Give a reason.

Q. 1. Choose the correct answers to the questions from the given options. (Do not copy the questions, write the correct answers only.)

(vii) When a body vibrates under a periodic force, the vibrations of the body are always : [1]

(a) natural vibrations
(b) damped vibrations
(c) forced vibrations
(d) resonant vibrations

(viii) Two notes are produced from two different musical instruments, such that they have same loudness and same pitch. The produced notes differ in their : [1]

(a) Waveform
(b) Frequency
(c) Wavelength
(d) Speed.

Q. 2. (vi) A metal foot ruler is held at the edge of a table. It is pressed at its free end and then released. It vibrates. [2]

(a) Name the vibrations produced.

(b) State one way to increase the frequency of these vibrations.

Q. 7. (i) (a) Which characteristic of sound is affected due to the larger surface of a school bell?

(b) Calculate the distance covered by the Ultrasonic wave having a velocity of 1.5 kms^{-1} in 14s, when it is received after reflection by the receiver of the SONAR. [3]

(iii) We are able to see the T.V. channels clearly when we set T.V. on auto-tuning. [4]

(a) Which phenomenon led to the clear visibility of the channels, due to auto-tuning?

(b) Define the above phenomenon mentioned by you.

(c) Give any one more example of this phenomenon.

2022

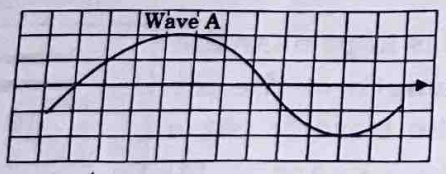
Q. 1. Choose the correct answers to the questions from the given options. (Do not copy the question. Write the correct answer only.)

(i) Free vibrations are : [1]

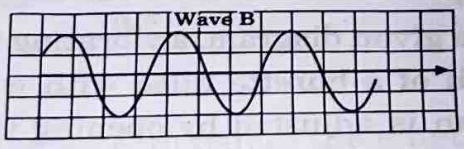
(a) the vibrations under the influence of a periodic force
(b) the vibrations with larger amplitude
(c) the vibrations when the frequency continuously decreases
(d) the vibrations with a constant frequency and constant amplitude

(ii) The diagram below shows four sound waves. Which sound has the highest pitch? [1]

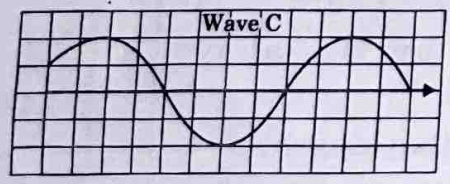
(a)



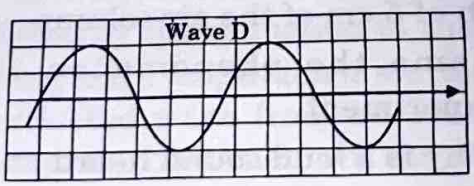
(b)



(c)



(d)



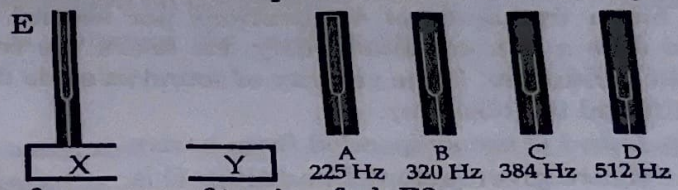
Q. 4. (i) Rohit playing a flute and Anita playing a piano emit sounds of same pitch and loudness. [3]

(a) Name one characteristic that is different for waves from the two different instruments.

(b) If now the loudness of the sound from flute becomes four times that of the sound from piano, then write the value of the ratio $A_F : A_p$. (A_F – amplitude of sound wave from flute, A_p amplitude of sound wave from piano)

(c) Define 'Pitch' of a sound.

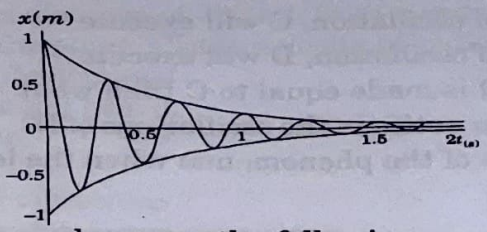
Q. 5. (ii) The diagram below shows a vibrating tuning fork E mounted on a sound box X. When the vibrating tuning forks A, B, C and D are placed on the sound box Y one by one, it is observed that a louder sound is produced when the tuning fork B is placed on Y. [3]



(a) What is the frequency of tuning fork E?

(b) Why does B produce a louder sound?

Q. 6.



(i) Study the above figure and answer the following :

(a) What type of vibration does the above figure represent?

(b) State one reason for which the amplitude of the vibration decreases with time

(c) Write an example of natural vibrations.

2020

Q. 3. (b) Draw a graph between displacement from mean position and time for a body execu free vibration in a vaccum.

(c) A sound wave travelling in water has wavelength 0.4 m.
Is this wave audible in air ? (The speed of sound in water = 1400 ms^{-1})

Q. 7. (b) (i) Name the system which enables us to locate underwater objects by transm ultrasonic waves and detecting the reflecting impulse.

(ii) What are acoustically measurable quantities related to pitch and loudness

(c) (i) When a tuning fork [vibrating] is held close to ear, one hears a faint hu same [vibrating tuning fork] is held such that its stem is in contact w table surface, then one hears a loud sound. Explain.

(ii) A man standing in front of a vertical cliff fires a gun. He hears the echo a seconds. On moving closer to the cliff by 84 m, he hears the echo after 3 Calculate the distance of the cliff from the initial position of the man.

2019

Q. 2. (d) A man playing a flute is able to produce notes of different frequencies. If he holes near his mouth, will the pitch of the note produced, increase or decre a reason.

Q. 3. (b) Two waves of the same pitch have amplitudes in the ratio 1 : 3. What will b of their :

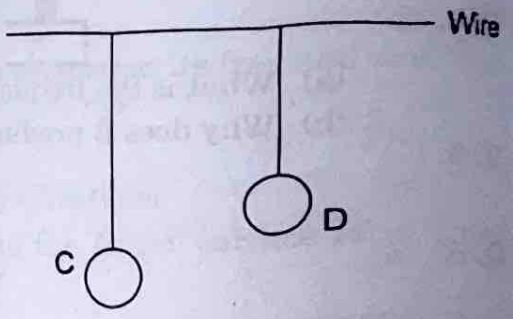
(i) intensities and (ii) frequencies?

(d) (i) Define resonant vibrations.
(ii) Which characteristic of sound, makes it possible to recognize a person by his voice without seeing him ? [2]

Q. 7. (a) It is observed that during march-past we hear a base drum distinctly from a distance compared to the side drums. [3]
(i) Name the characteristic of sound associated with the above observation.
(ii) Give a reason for the above observation.

(b) A pendulum has a frequency of 4 vibrations per second. An observer starts the pendulum and fires a gun simultaneously. He hears the echo from the cliff after 6 vibrations of the pendulum. If the velocity of sound in air is 340 m/s, find the distance between the cliff and the observer. [3]

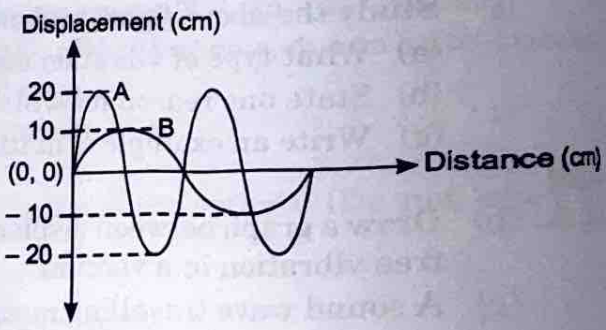
(c) Two pendulums C and D are suspended from a wire as shown in the figure given below. Pendulum C is made to oscillate by displacing it from its mean position. It is seen that D also starts oscillating. [4]



(i) Name the type of oscillation, C will execute.
(ii) Name the type of oscillation, D will execute.
(iii) If the length of D is made equal to C then what difference will you notice in the oscillations of D?
(iv) What is the name of the phenomenon when the length of D is made equal to C?

2018

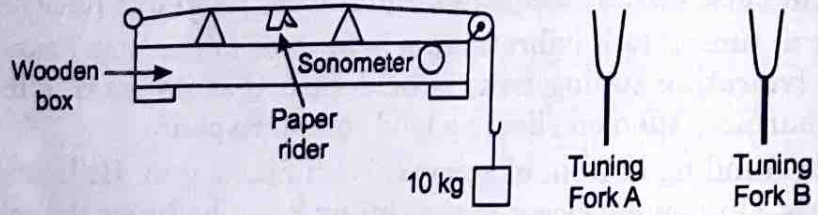
Q. 3. (a) Displacement distance graph of two sound waves A and B, travelling in a medium, are as shown in the diagram below : [2]



Study the two sound waves and compare their :
(i) Amplitudes
(ii) Wavelengths

(d) (i) What do you understand by free vibrations of a body?
(ii) Why does the amplitude of a vibrating body continuously decrease during damped vibrations? [2]

Q. 7. (b)

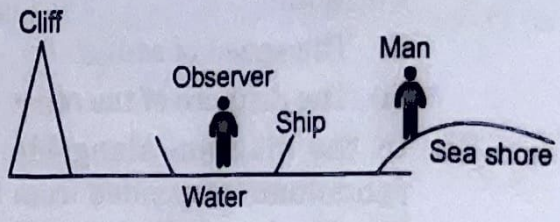


The diagram above shows a wire stretched over a sonometer. Stems of two vibrating tuning forks A and B touched to the wooden box of the sonometer. It is observed that the paper rider (a small piece of paper folded at the centre) present on the wire flies off when the stem of vibrating tuning fork B is touched to the wooden box but the paper just vibrates when the stem of vibrating tuning fork A is touched to the wooden box.
(i) Name the phenomenon when the paper rider just vibrates.
(ii) Name the phenomenon when the paper rider flies off.
(iii) Why does the paper rider fly off when the stem of tuning fork B is touched to the box ? [3]

(c) A person is standing at the sea shore. An observer on the ship which is anchored in between a vertical cliff and the person on the shore fires a gun. The person on the shore hears two sounds, 2 seconds and 3 seconds after seeing the smoke of the fired gun. If the speed of sound in the air is 320 ms^{-1} then calculate : [4]

(i) the distance between the observer on the ship and the person on the shore.

(ii) the distance between the cliff and the observer on the ship.



2017

Q. 3. (b) The human ear can defect continuous sounds in the frequency range from 20 Hz to 20,000 Hz. Assuming that the speed of sound in air is 330 ms^{-1} for all frequencies, calculate the wavelengths corresponding to the given extreme frequencies of the audible range. [2]

(c) An enemy plane is at a distance of 300 km from a radar. In how much time the radar will be able to detect the plane ? Take velocity of radiowaves at 3×10^8 ms^{-1}. [2]

Q. 8. (a) Name the factor that determines : [3]

(i) Loudness of the sound heard.

(ii) Quality of the note.

(iii) Pitch of the note.

(b) (i) What are damped vibrations ?

(ii) Give one example of damped vibrations.

(iii) Name the phenomenon that causes a loud sound when the stem of a vibrating tuning fork is kept pressed on the surface of a table. [3]

(c) (i) A wire of length 80 cm has a frequency of 256 Hz. Calculate the length of a similar wire under similar tension, which will have frequency 1024 Hz.

(ii) A certain sound has a frequency of 256 hertz and a wavelength of 1.3 m.

(1) Calculate the speed with which this sound travels.

(2) What difference would be felt by a listener between the above sound and another sound travelling at the same speed, but of wavelength 2.6 m ? [4]

2016

Q. 2. (e) The ratio of amplitude of two waves is 3 : 4. What is the ratio of their :

(i) loudness ? (ii) frequencies ? [2]

Q. 3. (b) What is meant by noise pollution ? Name one source of sound causing noise pollution. [2]

Q. 8. (a) (i) Name the waves used for echo depth sounding.

(ii) Give one reason for their use for the above purpose.

(iii) Why are the waves mentioned by you not audible to us ?

(b) (i) What is an echo ?

(ii) State two conditions for an echo to take place. [3]

(c) (i) Name the phenomenon involved in tuning a radio set to a particular station.

(ii) Define the phenomenon named by you in part (i) above.

(iii) What do you understand by loudness of sound ?

(iv) In which units is the loudness of sound measured ? [3]

2015

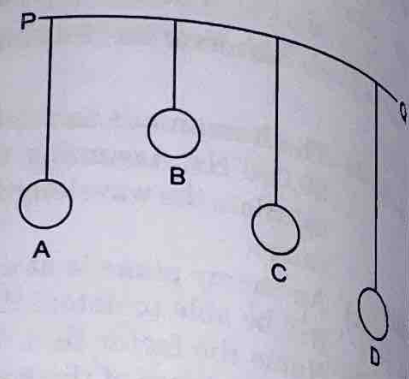
Q. 3. (c) (i) Draw a graph between displacement and the time for vibrations.

(ii) Where can a body execute free [4]

Q. 7. (a) (i) State the safe limit of sound level in terms of decibel for human hearing. [2]
(ii) Name the characteristic of sound in relation to its waveform. [1]

(b) A person standing between two vertical cliffs and 480 m from the nearest cliff shouts. He hears the first echo after 3s and the second echo 2s later.
Calculate :
(i) The speed of sound.
(ii) The distance of the other cliff from the person.

(c) In the diagram alongside, A, B, C, D are four pendulums suspended from the same elastic string PQ. The length of A and C are equal to each other while the length of pendulum B is smaller than that of D. Pendulum A is set into a mode of vibrations.
(i) Name the type of vibrations taking place in pendulums B and D ?
(ii) What is the state of pendulum C ?
(iii) State the reason for the type of vibrations in pendulums B and C. [5]



CHAPTER 8

Current Electricity

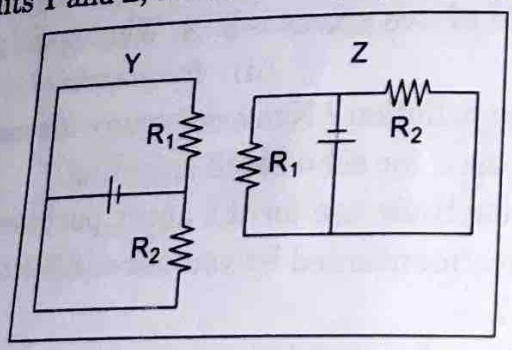
2025

Q. 1. Choose the correct answer to the question from the given options. (Do not copy the question, write the correct answer only.)

(ix) In a closed circuit containing a bulb and a cell, the electromotive force (ε) and the terminal voltage (V) is related as : (Given I is current and r is internal resistance.) [1]

(a) $V = \varepsilon + Ir$ (b) $V = \varepsilon - Ir$
(c) $V = \varepsilon \div Ir$ (d) $V = \varepsilon \times Ir$

(xii) In the given circuits Y and Z, the resistors, R_1 and R_2, are connected in : [1]



(a) series in both the circuits (b) parallel in both the circuits
(c) parallel in Y and series in Z (d) series in Y and parallel in Z

Q. 2. (i) Complete the following by choosing the correct answer from the bracket :
(d) Emf of a cell is _____ [greater than/less than/equal to] the terminal voltage when the cell is in open circuit. [1]

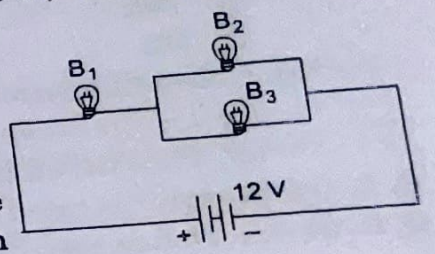
Q. 3. (iii) (a) Which of the two, alternating current or direct current, produces a varying magnetic field when it flows through a conductor ?
(b) State the frequency of the alternating current supply in India. [2]

(vi) A current flows through a metallic conductor for a long period of time. State the change you would expect in its : [2]

(a) Resistance

(b) Resistivity

Q. 8. (iii) Three identical bulbs B_1, B_2, and B_3 each of power rating 18 W, 12 V are connected to a battery of 12 V. [4]



(a) Calculate :

1. the resistance of each bulb
2. the current drawn from the cell

(b) If the bulb B_3 is removed from the circuit, then will the brightness of the bulb B_1 increase, decrease or remain the same ?

2024

Q. 1. Choose the correct answers to the questions from the given options. (Do not copy the questions, write the correct answers only.) [1]

(viii) The specific resistance of a conductor depends on its:

(a) length (b) material

(c) area of cross-section (d) radius

(x) The potential difference between terminals of a cell in a closed electric circuit is : [1]

(a) terminal voltage (b) electro motive force

(c) voltage drop (d) none of these

Q. 2. (vi) 5 bulbs are connected in series in a room. One bulb is fused. It is removed and remainin 4 bulbs are again connected in series to the same circuit. What will be the effect on th following physical quantities? (Increases, Decreases, Remain Same)

(a) Resistance

(b) Intensity of light

Q. 8. (i) The voltage-current readings of a certain material are shown in the table given belov

Voltage (V)	10 V	20 V	30 V
Current (I)	2 A	3 A	4 A

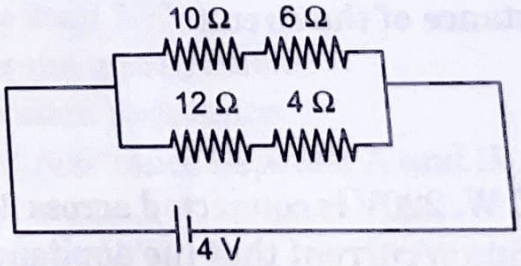
Study the table.

(a) State whether the conductor used is ohmic or non-ohmic.

(b) Justify your answer.

(c) State Ohm's law.

(iii) Study the diagram :



(a) Calculate the total resistance of the circuit.

(b) Calculate the current drawn from the cell.

(c) State whether the current through 10 Ω resistor is greater than, les equal to the current through the 12 Ω resistor.

Q. 1. Choose the correct answers to the questions from the given options. (Do not copy the questions, write the correct answers only.)

(ix) When a current I flows through a wire of resistance R for time t then the electrical energy produced is given by : [1]

(a) I^2Rt (b) IR^2t

(c) IRt (d) IRt^2

(x) Choose the correct relation for e.m.f. (ε) and terminal voltage V : [1]

(a) $\varepsilon = V$ (always) (b) $V > \varepsilon$ (always)

(c) $V < \varepsilon$ (when the cell is in use) (d) None of these

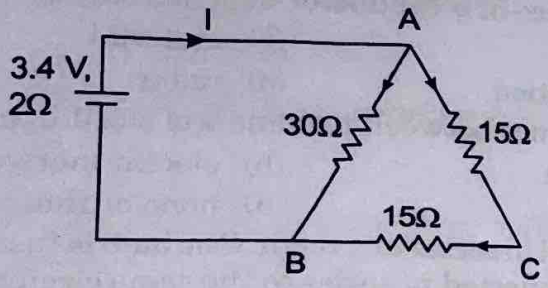
Q.2. (vii) 'A geyser is rated 240 W – 220 V'. Explain the meaning of this statement. [2]

Q.8. (i) (a) Define specific resistance.

(b) What happens to the specific resistance of a conductor if its length is doubled ?

(c) Name a substance whose specific resistance remains almost unchanged with the increase in its temperature. [3]

(iii) Find the value of current I drawn from the cell. [4]



(a) Calculate the current I.

(b) Calculate the terminal voltage.

2022

Q.1. Choose the correct answer to the question from the given options. (Do not copy the question. Write the correct answer only.)

(iii) The graph plotted for potential difference (V) against current (I) for ohmic resistors is : [1]

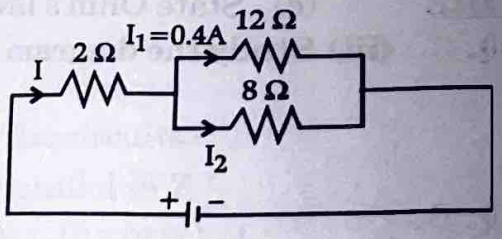
(a) A curve passing through the origin

(b) A straight line not passing through origin

(c) A straight line passing through origin

(d) A circle centred at the origin

Q.2. (iii) In the above circuit diagram, calculate : [4]



(a) the external resistance of the circuit

(b) the current I_2

(c) the current I.

Q.5. (i) An appliance rated 440 W, 220V is connected across 220V supply. [3]

(a) Calculate the maximum current that the appliance can draw.

(b) Calculate the resistance of the appliance.

Q.6. (iii) If a wire of resistance 2 Ω gets stretched to thrice its original length: [4]

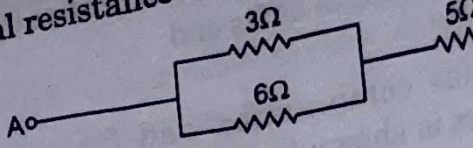
(a) Calculate the new resistance of the wire.

(b) What happens to the specific resistance of the wire?

2020

Q. 1. (b) Define a kilow

Q. 4. (a) Calculate the total resistan



Q. 8. (b) (i) What are superconductors ?

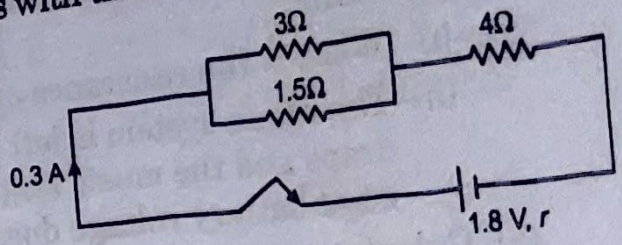
(ii) Calculate the current drawn by an appliance rated 110 W, 220 V when connected across 220 V supply.

(iii) Name a substance whose resistance decreases with the increase in temperature. [3]

(c) The diagram above shows three resistors connected across a cell of e.m.f. 1.8 V and internal resistance r. Calculate : [4]

(i) Current through 3 Ω resistor.

(ii) The internal resistance r.



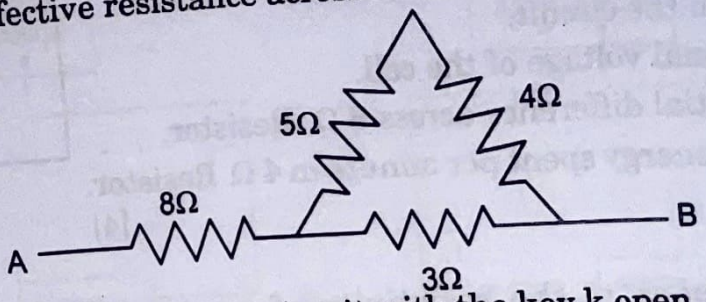
2019

Q. 3. (c) How does an increase in the temperature affect the specific resistance of a : [2]

(i) Metal and

(ii) Semiconductor? [2]

Q. 4. (a) Calculate the effective resistance across AB :



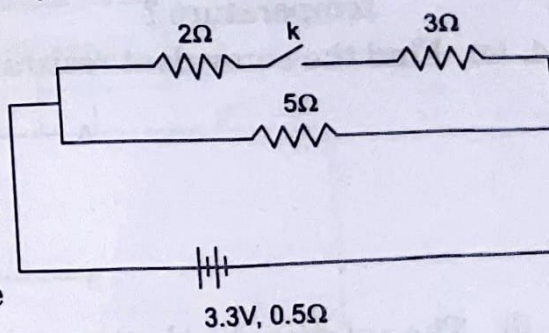
Q. 8. (c) The diagram alongside shows a circuit with the key k open. Calculate :

(i) the resistance of the circuit when the key k is open.

(ii) the current drawn from the cell when the key k is open.

(iii) the resistance of the circuit when the key k is closed.

(iv) the current drawn from the cell when the key k is closed.



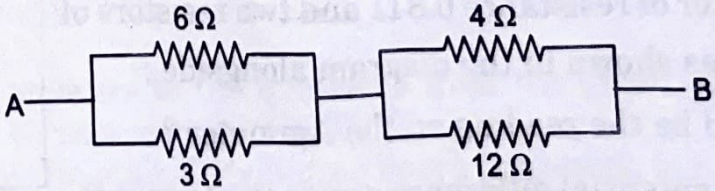
2018

Q. 3. (b) You have three resistors of values 2Ω, 3Ω and 5Ω. How will you join them so tha total resistance is more than 7Ω?

(i) Draw a diagram for the arrangement.

(ii) Calculate the equivalent resistance.

Q. 8. (b) (i) Find the equivalent resistance between A and B.



(ii) State whether the resistivity of a wire changes with the change in the th of the wire.

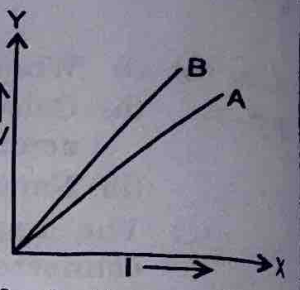
2017

Q. 3. (e) Define specific resistance and state its SI unit.

Q. 4. (a) An electric bulb of resistance 500Ω, draws a current of 0.4A. Calculate the power of the bulb and the potential difference at its end. [2]

2016

Q. 3. (c) The V-I graph for a series combination and for a parallel combination of two resistors is shown in the figure. Which of the two A or B, represents the parallel combination ? Give a reason for your answer. [2]



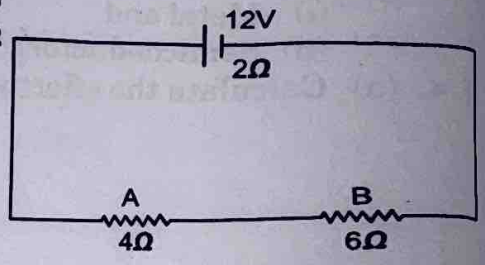
(d) A music system draws a current of 400 mA when connected to a 12V battery.

(i) What is the resistance of the music system ?

(ii) The music system is left playing for several hours and finally the battery voltage drops and the music system stops playing when the current drops to 320 mA. At what battery voltage does the music system stop playing ? [2]

(e) Calculate the quantity of heat produced in a 20 Ω resistor carrying 2.5A current in 5 minutes. [2]

Q. 9. (c) A battery of emf 12V and internal resistance 2 Ω is connected with two resistors A and B of resistance 4 Ω and 6 Ω respectively joined in series. Find :



(i) Current in the circuit.

(ii) The terminal voltage of the cell.

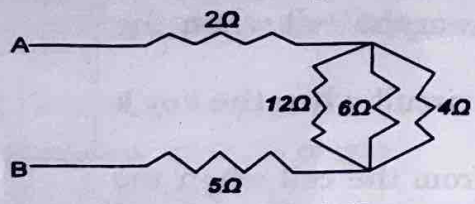
(iii) The potential difference across 6 Ω Resistor.

(iv) Electrical energy spent per minute in 4 Ω Resistor. [4]

2015

Q. 3. (d) (i) What happens to the resistivity of semi-conductors with the increase of temperature ? [1]

Q. 4. (c) Find the equivalent resistance between points A and B :



[2]

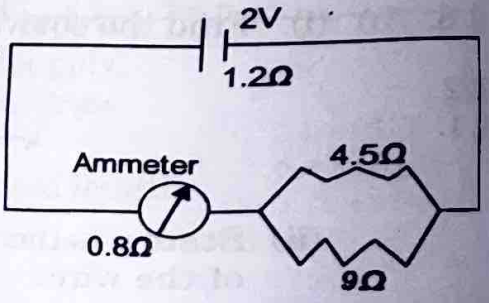
Q. 8. (b) The relationship between the potential difference and the current in a conductor is stated in the form of a law.

(i) Name the law.

(ii) What does the slope of V-I graph for a conductor represent?

(iii) Name the material used for making the connecting wire. [3]

(c) A cell of Emf 2V and internal resistance 1.2 Ω is connected with an ammeter of resistance 0.8 Ω and two resistors of 4.5 Ω and 9 Ω as shown in the diagram alongside :



(i) What would be the reading on the Ammeter ?

(ii) What is the potential difference across the terminals of the cell ? [4]

CHAPTER 9

Electric Power and House-hold Circuiting

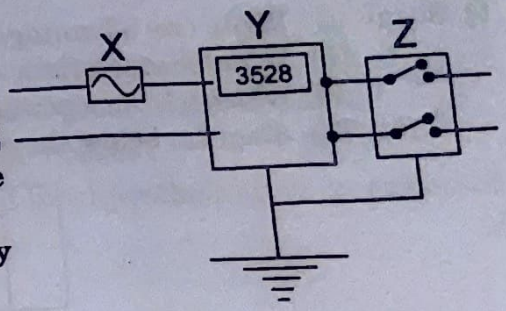
2025

Q. 3. (ii) According to the NEW colour convention which colour of wire is connected to : [2]

(a) the metal body of the appliance

(b) the switch of the appliance ?

Q. 8. (i) The diagram shows wiring in a meter room of a building. [3]



(a) What is the current rating of device X ?

(b) What is the difference between the switch Z shown in the diagram and the switches you use to operate different appliances at home ?

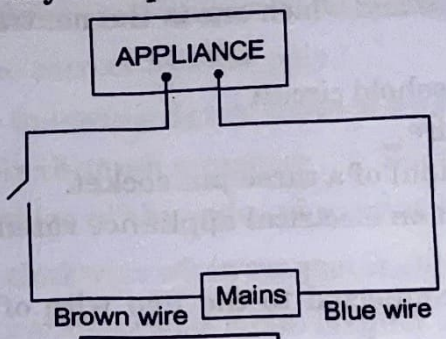
(c) What is the unit of the physical quantity displayed in Y ?

2024

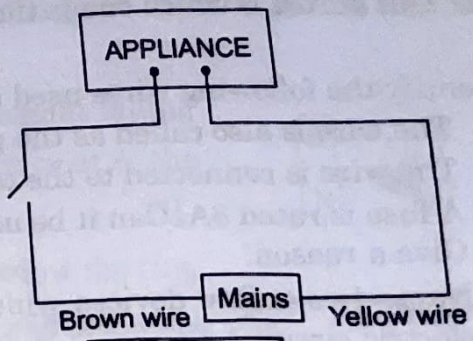
Q. 1. Choose the correct answer to the question from the given options. (Do not copy the question, write the correct answer only.)

(ix) Identify the option that displays the correct wiring with correct colour code : [1]

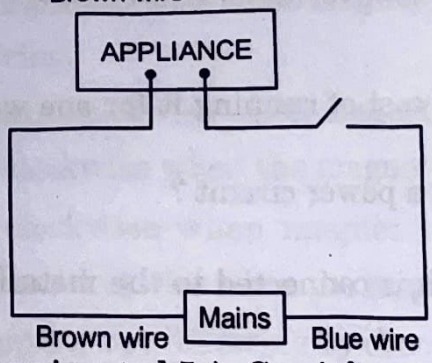
(a)



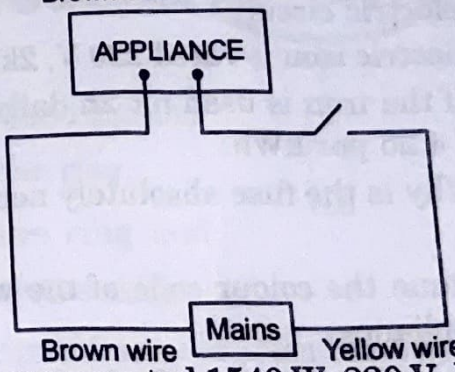
(b)



(c)



(d)



Q. 3. (ii) A fuse is rated 5 A. Can it be used with a geyser rated 1540 W, 220 V. Write Yes o
Give supporting calculations to justify your answer.

2023

Q. 3. (ii) (a) Which electrical component protects the electric circuit in case of excess cu
and which can also be used as a switch ?

(b) Name the wire to which this electrical component is connected in an electric

2022

Q. 1. Choose the correct answers to the questions from the given options. (Do not c
question. Write the correct answer only.)

(iv) A main switch in the main distribution board is present in :

(a) a live wire (b) a neutral wire

(c) a live as well as neutral wire (d) an earth wire

Q. 3. (i) Three wires with proper colour coding are connected to the three terminals of a thr pin socket. Match the colour of the wire with the proper terminals A, B and C of th socket.

(a) Brown (b) Green (c) Light blue

2020

Q. 3. (e) Why is it not advisable to use a piece of copper wire as fuse wire in an electric circuit ?

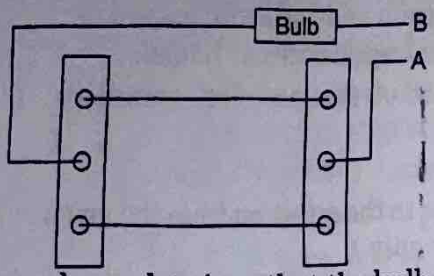
2019

Q. 8. (a) (i) Write one advantage of connecting electrical appliances in parallel combination.

(ii) What characteristics should a fuse wire have?

(iii) Which wire in a power circuit is connected to the metallic body of the appliance?

(b) The diagram below shows a dual control switch circuit connected to a bulb.



(i) Copy the diagram and complete is so that the bulb is switched ON.

(ii) Out of A & B which one is the live wire and which one is the neutral wire?

2018

Q. 4. (c) Identify the following wires used in a household circuit ;

(i) The wire is also called as the phase wire.

(ii) The wire is connected to the top terminal of a three pin socket.

Q. 8. (a) (i) A fuse is rated 8A. Can it be used with an electrical appliance rated 5KW, 200 Give a reason.

(ii) Name two safety devices which are connected to the live wire of a household electric circuit.

(c) An electric iron is rated 220 V, 2kW.

(i) If the iron is used for 2h daily find the cost of running it for one week if it co ₹ 4.25 per kWh.

(ii) Why is the fuse absolutely necessary in a power circuit ?

2017

Q. 9. (a) (i) Name the colour code of the wire which is connected to the metallic body of appliance.

(ii) Draw the diagram of a dual control switch when the appliance is switched 'ON

(b) (i) Which particles are responsible for current in conductors ?

(ii) To which wire of a cable in a power circuit should the metal case of a geyser connected ?

(iii) To which wire should the fuse be connected ?

(c) (i) Explain the meaning of statement 'Current rating of a fuse is 5 A'.

(ii) In the transmission of power the voltage of power generated at the generat stations is stepped up from 11KV to 132KV before it is transmitted. Why ?

2016

Q. 4. (d) State the characteristics required in a material to be used as an effective fuse wir

Q. 9. (a) (i) Which particles are responsible for current in conductors ?

(ii) To which wire of a cable in a power circuit should the metal case of a geyser be connected ?

(iii) To which wire should the fuse be connected ? [3]

(b) (i) Name the transformer used in the power transmitting station of a power plant.

(ii) What type of current is transmitted from the power station ?

(iii) At what voltage is this current available to our household ? [3]

2015

Q. 3. (d) (ii) For a fuse, higher the current rating ..... is the fuse wire. [1]

Q. 8. (a) (i) Name the device used to increase the voltage at a generating station.

(ii) At what frequency is A.C. supplied to residential houses ?

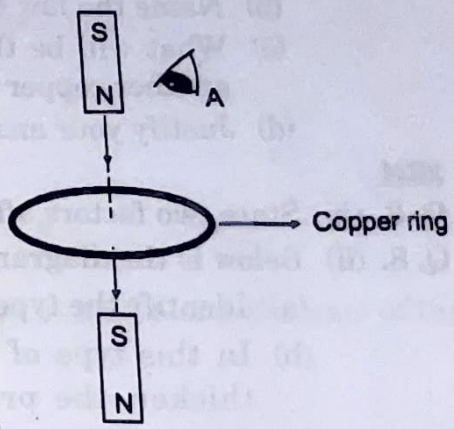
(iii) Name the wire in a household electrical circuit to which the switch is connected. [3]

CHAPTER 10
Electro-Magnetism

2025

Q. 1. Choose the correct answer to the question from the given options. (Do not copy the question, write the correct answer only.)

(xv) The following figure shows a small bar magnet falling freely through a copper ring. For the observer at A, the direction of the induced current will be : [1]



(a) clockwise when magnet is above and below the ring.

(b) anticlockwise when magnet is above and below the ring.

(c) anticlockwise when magnet is above the ring and clockwise when the magnet is below the ring.

(d) clockwise when magnet is above the ring and anticlockwise when the magnet is below the ring.

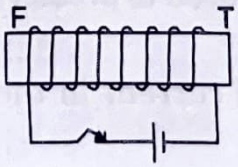
Q. 2. (i) Complete the following by choosing the correct answer from the bracket :

(e) In a step-up transformer the turns ratio is _____ [more than 1/less than 1/equal to 1].

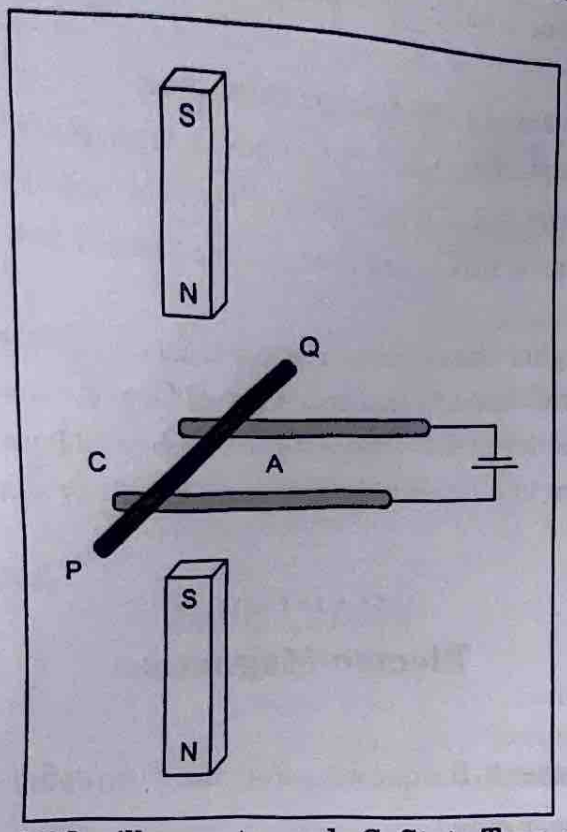
Q. 3. (v) Copper wire is wound around a steel bar FT. Current is allowed to pass through t coil for some time and then the bar is removed.

(a) Draw only the magnetised bar FT and mark its poles.

(b) Trace two magnetic lines of force around FT clearly indicating the direction.



current is kept in a magnetic field as shown in the diagram. [4]



(a) The copper rod PQ will move towards C. State True or False.

(b) Name the law used to determine the direction of motion of PQ.

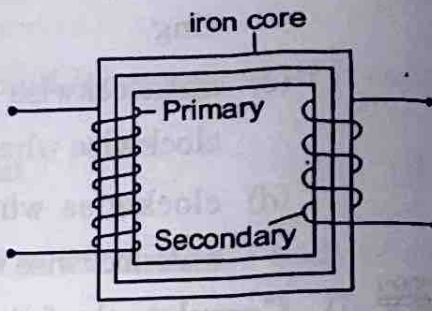
(c) What will be the effect on the force experienced, if the rod PQ is replaced by another copper rod of same length but of greater cross-sectional area ?

(d) Justify your answer in (c).

2024

Q. 3. (iii) State two factors affecting the speed of rotation of the coil in a D.C. motor. [2]

Q. 8. (ii) Below is the diagram of a transformer : [3]

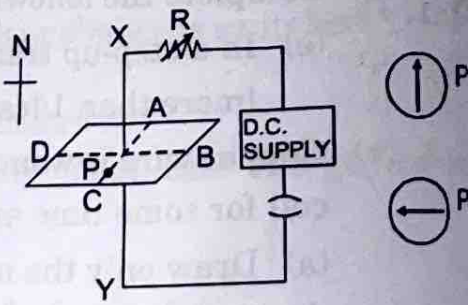


(a) Identify the type of transformer.

(b) In this type of transformer which of the wire is thicker, the primary or the secondary? Give a reason.

Q. 9. (iii) (a) State one factor that affects the magnitude of induced current in an AC generator.

(b) Given below is a circuit to study the magnetic effect of electric current. ABCD is a cardboard kept perpendicular to the conductor XY. A magnetic compass is placed at the point P of the cardboard. P_1 and P_2 are the positions of the magnetic compass, before and after passing a current through XY respectively. [4]



(1) Name the rule that is used to predict the direction of deflection of the magneti compass.

(2) State the direction of current in the conductor (X to Y or Y to X) when th circuit is complete.

(3) If resistance R is increased, then what will be the effect on the magnetic lines of force around the conductor?

2023

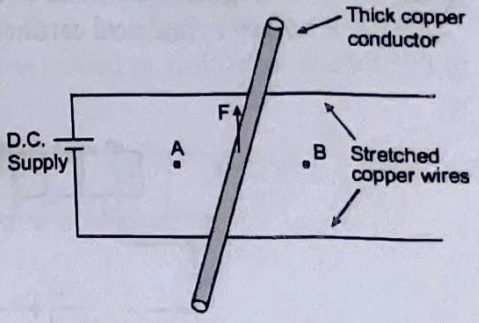
Q. 1. Choose the correct answer to the question from the given options. (Do not copy the question, write the correct answer only.)

(xi) If the strength of the current flowing through a wire is increased, the strength of the magnetic field produced by it : [1]

(a) decreases (b) increases

(c) remains the same (d) first increases then decreases

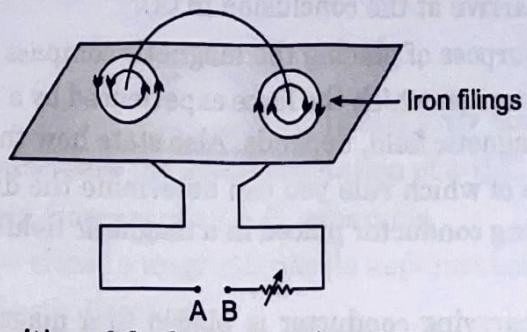
Q. 3. (iii) A copper conductor is placed over two stretched copper wires whose ends are connected to a D.C. supply as shown in the diagram. [2]



(a) What should be the magnetic poles at the points A and B lying on either side of the conductor to experience the force in the upward direction ?

(b) Name the law used to find these polarities.

Q. 9. (iii) The diagram below shows a cardboard on which iron filings are kept. A wire bent in the form of a loop is seen passing through the cardboard. When current flows through it the iron filings arrange themselves as shown below : [4]



(a) State the polarities of the battery at A and B.

(b) State the effect on the magnetic field if an iron rod is held along the axis of the coil.

(c) State one way to :

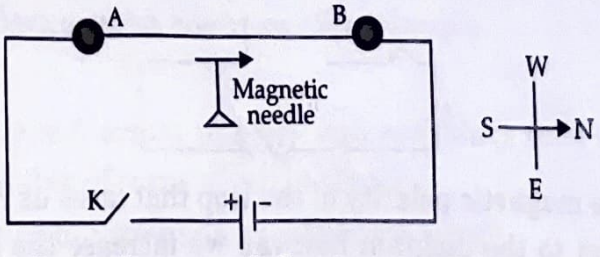
(1) Change the polarity of the coil.

(2) Decrease the strength of the magnetic field around the coil.

2022

Q. 1. Choose the correct answers to the questions from the given options. (Do not copy the question. Write the correct answer only.)

(v) A conductor AB is kept along north south direction of the earth above a magnetic needle as shown below. When the key K is closed then : [1]

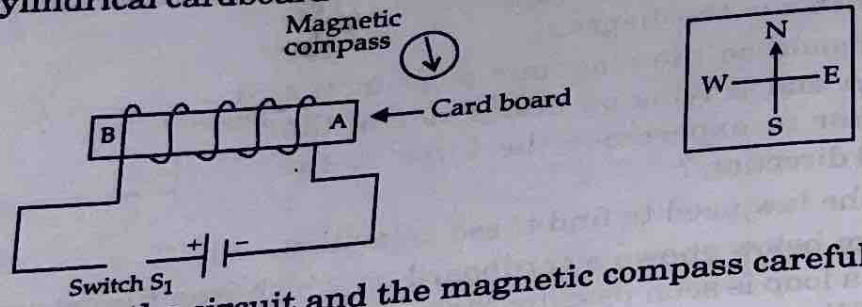


(a) the needle will not show any deflection

(b) the needle will deflect towards east
(c) the needle will turn in the opposite direction *i.e.* towards south
(d) the needle will deflect towards west.

(vi) A coil wound around a piece of soft iron can become an electromagnet only when : [1]
(a) the circuit is open
(b) a magnetic compass is present in the vicinity
(c) a galvanometer is connected to the circuit
(d) a current flows in the circuit.

Q. 2. (i) The diagram below shows a magnetic compass kept closer to a coil AB wound around a hollow cylindrical cardboard : [3]



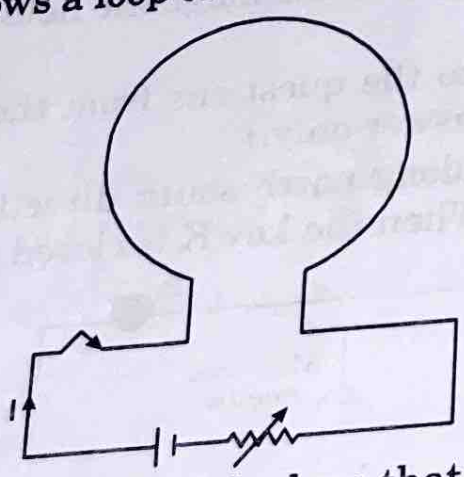
(a) After studying the circuit and the magnetic compass carefully, state whether the switch S_1 is open or closed.
(b) How did you arrive at the conclusion in (a)?
(c) What is the purpose of placing the magnetic compass in the above setup?

Q. 4. (ii) (a) Name two factors on which the force experienced by a conductor carrying current, placed in a magnetic field, depends. Also state how these factors affect the force.
(b) With the help of which rule you can determine the direction of force acting on a current carrying conductor placed in a magnetic field? [3]

2020

Q. 4. (c) When a current carrying conductor is placed in a magnetic field, it experiences a mechanical force. What should be the angle between the magnetic field and the length of the conductor so that the force experienced is : [2]
(i) Zero
(ii) Maximum ?

(e) The diagram below shows a loop of wire carrying current I : [2]

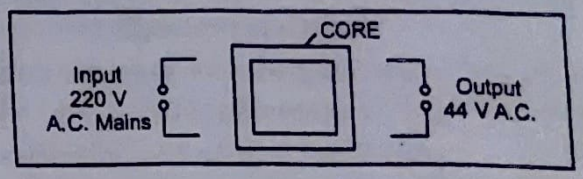


(i) What is the magnetic polarity of the loop that faces us ?
(ii) With respect to the diagram how can we increase the strength of the magnetic field produced by this loop ?

Q. 8. (a) The diagram below shows the core of a transformer and its input and output connections : [3]

(i) State the material used for the core.

(ii) Copy and complete the diagram of the transformer by drawing input and output coils.

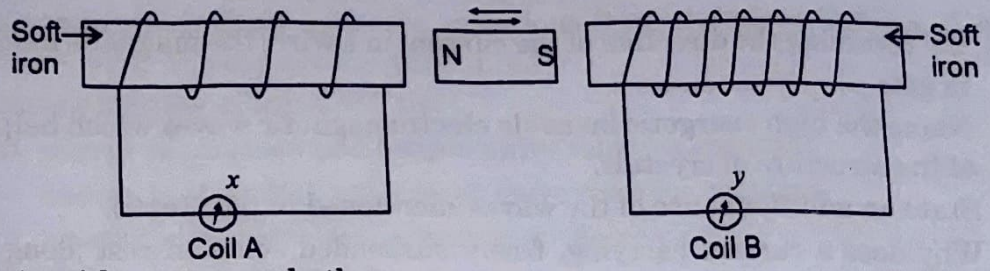


Q.10. (a) (i) Draw a neat labeled diagram of a d.c. motor.

(ii) Write any one use of a d.c. motor. [3]

2019

Q. 4. (c) A magnet kept at the centre of two coils A and B is moved to and fro as shown in the diagram. The two galvanometers show deflection. [2]



State with a reason whether :

x > y

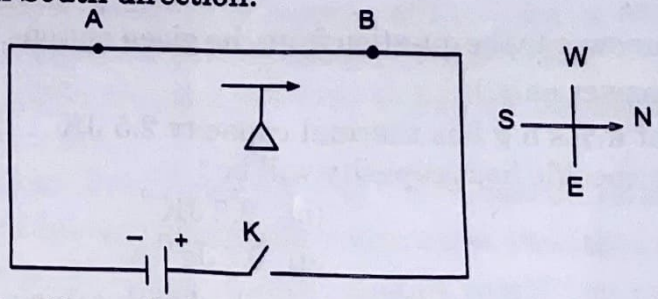
or

x < y. [x and y are magnitudes of deflection.]

(e) State two ways to increase the speed of rotation of a D.C. motor. [2]

Q.10. (a) Draw a neat labeled diagram of an A.C. generator. [3]

(c) The diagram below shows a magnetic needle kept just below the conductor AB which is kept in North South direction. [4]



(i) In which direction will the needle deflect when the key is closed?

(ii) Why is the deflection produced?

(iii) What will be the change in the deflection if the magnetic needle is taken just above the conductor AB?

(iv) Name one device which works on this principle.

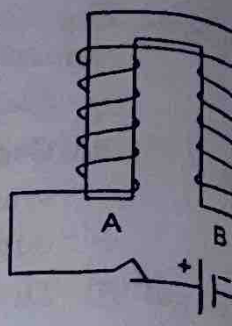
2018

Q. 3. (e) (i) How is the e.m.f. across primary and secondary coils of a transformer related with the number of turns of coil in them?

(ii) On which type of current do transformers work?

Q. 4. (e) State any two advantages of electromagnets over permanent magnets.

Q.10. (a) The diagram shows a coil wound around a U shape soft iron bar AB.



(i) What is the polarity induced at the ends A and B when the switch is pressed?

(ii) Suggest one way to strengthen the magnetic field in the electromagnet.

(iii) What will be the polarities at A & B if the direction of current is reversed in the circuit ? [3]

2017

Q. 4. (b) State two causes of energy loss in a transformer.

2016

Q. 4. (e) Which coil of a step up transformer is made thicker and why ?

2015

Q. 1. (b) (ii) On reversing the direction of the current in a wire, the magnetic field produced it gets .....

Q. 3. (e) (i) Name the high energetic invisible electromagnetic waves which help in the stu of the structure of crystals.

(ii) State an additional use of the waves mentioned in part (e) (i).

Q. 4. (b) (i) Why does a current carrying, freely suspended solenoid rest along a particu direction ?

(ii) State the direction in which it rests.

(d) Give two similarities between an A.C. generator and a D.C. motor.

CHAPTER 11
Calorimetry

2025

Q. 1. Choose the correct answer to the question from the given options. (Do not copy the questi write the correct answer only.)

(x) A metal piece of mass 5 g has thermal capacity 2.5 JK^{-1}. If the mass of the meta tripled, then its specific heat capacity will be :

(a) 7.5 JK^{-1} (b) 2.5 JK^{-1}

(c) 1.5 $Jg^{-1}K^{-1}$ (d) 0.5 $Jg^{-1}K^{-1}$

(xiv) Each of the substances given below is supplied with same amount of heat. Which will attain the highest temperature ?

Substance	Lead	Aluminium	Copper	Iron
Specific heat capacity (cal/g°C)	0.031	0.21	0.095	0.115

(a) Aluminium (b) Copper

(c) Iron (d) Lead

Q. 2. (i) Complete the following by choosing the correct answer from the bracket :

(c) Heat absorbed during change of phase depends on _____ [mass/change temperature/specific heat capacity] of the substance.

Q. 3. (iv) Calculate the amount of heat absorbed by 200 g of paraffin wax to melt completely at its melting point. [2]

[Specific latent heat of fusion of paraffin wax = 146 Jg^{-1}]

Q. 9. (i) 30 g of ice at 0°C is used to bring down the temperature of a certain mass of water at 70°C to 20°C. Find the mass of water. [Specific heat capacity of water = 4.2 $Jg^{-1}°C^{-1}$ and specific latent heat of ice = 336 Jg^{-1}.] [3]

(ii) (a) A certain amount of heat will warm 1 g of material X by 10°C and 1 g of material Y by 40°C. Which material has higher specific heat capacity ?

(b) Which material, X or Y, would you select to make a calorimeter ?

(c) The specific heat capacity of a substance remains the same when it changes its state from solid to liquid. State True or False. [3]

2024

Q. 1. Choose the correct answers to the questions from the given options. (Do not copy the questions, write the correct answers only.)

(xi) During melting of ice at 0°C the : [1]

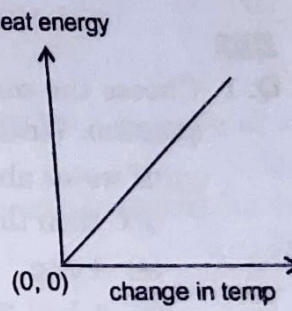
(a) energy is released and temperature remains constant.

(b) energy is absorbed and temperature remains constant.

(c) energy is released and temperature decreases.

(d) energy is absorbed and temperature increases.

(xiv) The graph given below shows heat energy supplied against change in temperature when no energy is lost to the surrounding. The slope of this graph will give : [1]



(a) Specific heat capacity

(b) Latent heat of fusion

(c) Latent heat of vaporization

(d) Heat capacity

Q. 3. (iv) How much heat is required to convert 500 g of ice at 0°C to water at 0°C? The latent heat of fusion of ice is 330 Jg^{-1}.

Q. 9. (i) 85 g of water at 30°C is cooled to 5°C by adding certain mass of ice. Find the mass of i required.

[Specific heat capacity of water = 4.2 $Jg^{-1}°C^{-1}$, Specific latent heat of fusion = 336 Jg

(ii) (a) Why does it become pleasantly warm when the lakes start freezing?

(b) Water freezes to form ice. What change would you expect in the average kine energy of the molecules?

(c) Which will contain more heat energy 1 g of ice at 0°C or 1 g water at 0°C?

2023

Q. 1. Choose the correct answers to the questions from the given options. (Do not copy questions, write the correct answers only.)

(xii) Specific latent heat of a substance :

(a) is directly proportional to the mass

(b) is directly proportional to the change in the temperature

(c) depends on the material

(d) is inversely proportional to the mass

(xiii) Specific heat capacity of a substance X is 1900 $Jkg^{-1}\,°C^{-1}$ means : [1]

(a) Substance X absorbs 1900 J for 1°C rise in temperature

(b) 1 kg of substance X absorbs 1900 J heat for 1°C rise in temperature

(c) 1 kg of substance X absorbs 1900 J heat to increase the temperature

(d) 1 kg substance X absorbs 1900 J heat to cool down by 1°C

Q. 2. (i) (a) When does the nucleus of an atom tend to become radioactive ? [1]

Q. 3. (iv) Thermal capacities of substances A and B are same. If mass of A is more than mass of B then : [2]

(a) Which substance will have more specific heat capacity ?

(b) Which substance will show greater rise in temperature if the same amount of heat is supplied to both ?

Q. 9. (i) Calculate the total amount of heat energy required to melt 200 g of ice at 0°C to water at 100°C.

(Specific latent heat of ice = 336 J g^{-1}, specific heat capacity of water = 4.2 J $g^{-1}\,°C^{-1}$) [3]

(ii) (a) State the principle of calorimetry.

(b) Name the material used for making a calorimeter.

(c) Write one characteristic property of the material chosen for making a calorimeter. [3]

2022

Q. 1. Choose the correct answers to the questions from the given options. (Do not copy the question. Write the correct answer only.)

(vii) If water absorbs 4000 joule heat to increase the temperature of 1 kg water through 1°C then the specific heat capacity of water is : [1]

(a) 4 $Jkg^{-1}\,°C^{-1}$ (b) 400 $Jg^{-1}\,°C^{-1}$

(c) 4 $Jg^{-1}\,°C^{-1}$ (d) 4.2 $Jg^{-1}\,°C^{-1}$

(viii) Water is used in car radiators because : [1]

(a) it is a good conductor of heat.

(b) it conducts heat faster as compared to the other substances and cools the engine quickly.

(c) its specific heat capacity is very low.

(d) its specific heat capacity is very high so it can cool the engine without a greater increase in its own temperature.

Q. 2. (ii) (a) Give an important reason for copper to be used as a material for a calorimeter.

(b) Calculate the thermal capacity of 40 g of water.

[Specific heat capacity of water = 4200 $Jkg^{-1}\,°C^{-1}$] [3]

Q. 3. (ii) (a) Why does it become colder after a hailstorm than during or before the hailstorm?

(b) "If two bodies have the same specific heat capacities, then they will always absorb the same amount of heat if their temperature increases by the same amount." State whether the given statement is true or false. [3]

(iii) A metal piece of mass 420g present at 80°C is dropped in 80g of water present at 20°C in a calorimeter of mass 84g. If the final temperature of the mixture is 30°C then

calculate the specific heat capacity of the metal piece. [Specific heat capacity of water = 4.2 $Jg^{-1}\,°C^{-1}$. [4]

(Specific heat capacity of the calorimeter = 200 $Jkg^{-1}\,°C^{-1}$)

Q. 5. (iii) (a) From the graph of heating curve given below state the melting point and boiling point of the substance. [2]

2020

Q. 3. (d) Why does stone lying in the sun get heated up much more than water lying for the same duration of time ? [2]

Q. 4. (b) Two metallic blocks P and Q having masses in ratio 2 : 1 are supplied with same amount of heat. If their temperature rise by same degree, compare their specific heat capacities. [2]

Q. 9. (a) (i) Define heat capacity of a substance.

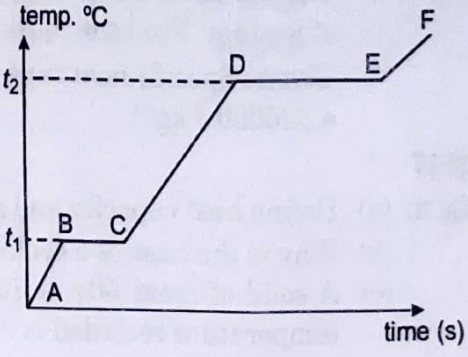
(ii) Write the SI unit of heat capacity.

(iii) What is the relationship between heat capacity and specific heat capacity of a substance ? [3]

(b) The diagram below shows the change of phases of a substance on a temperature vs time graph on heating the substance at a constant rate. [3]

(i) Why is the slope of CD less than slope of AB ?

(ii) What is the boiling and melting point of the substance ?



(c) A piece of ice of mass 60 g is dropped into 140 g of water at 50°C. Calculate the final temperature of water when all the ice has melted. [4]

(Assume no heat is lost to the surrounding)

Specific heat capacity of water = 4.2 $Jg^{-1}k^{-1}$

Specific latent heat of fusion of ice = 336 Jg^{-1}

2019

Q. 1. (c) (i) Name the physical quantity which is measured in calories.

(ii) How is calorie related to the S.I. unit of that quantity ? [2]

Q. 2. (c) The specific heat capacity of a substance A is 3,800 $Jkg^{-1}K^{-1}$ and that of a substance B is 400 $Jkg^{-1}K^{-1}$. Which of the two substances is a good conductor of heat? Give a reason for your answer. [2]

Q. 4. (b) (i) State whether the specific heat capacity of a substance remains the same when its state changes from solid to liquid.

(ii) Give one example to support your answer. [2]

Q. 9. (a) (i) Define Calorimetry.
(ii) Name the material used for making a Calorimeter.
(iii) Why is a Calorimeter made up of thin sheets of the above material answered in (ii)? [3]

(b) The melting point of naphthalene is 80°C and the room temperature is 30°C. A sample of liquid naphthalene at 100°C is cooled down to the room temperature. Draw a temperature time graph to represent this cooling. In the graph, mark the region which corresponds to the freezing process. [3]

(c) 104 g of water at 30°C is taken in a calorimeter made of copper of mass 42 g. When a certain mass of ice at 0°C is added to it, the final steady temperature of the mixture after the ice has melted, was found to be 10°C. Find the mass of ice added. [Specific heat capacity of water = 4.2 J g^{-1} $°C^{-1}$; Specific latent heat of fusion of ice = 336 J g^{-1}; Specific heat capacity of copper = 0.4 Jg^{-1} $°C^{-1}$] [4]

2018

Q. 4. (a) (i) How can a temperature in degree Celsius be converted into S.I. unit of temperature ?
(ii) A liquid X has the maximum specific heat capacity and is used as a coolant in Car radiators. Name the liquid X. [2]

(b) A solid metal weighing 150 g melts at its melting point of 800 °C by providing heat at the rate of 100 W. The time taken for it to completely melt at the same temperature is 4 min. What is the specific latent heat of fusion of the metal? [2]

Q. 9. (a) (i) Heat supplied to a solid changes it into liquid. What is this change in phase called?
(ii) During the phase change does the average kinetic energy of the molecules of the substance increase?
(iii) What is the energy absorbed during the phase change called ? [3]

(b) (i) State two differences between "Heat Capacity" and "Specific Heat Capacity".
(ii) Give a mathematical relation between Heat Capacity and Specific Heat Capacity. [3]

(c) The temperature of 170g of water at 50°C is lowered to 5°C by adding certain amount of ice to it. Find the mass of ice added. [4]
Given : Specific heat capacity of water = 4200 J kg^{-1} $°C^{-1}$ and Specific latent heat of ice = 336000 J kg^{-1}.

017

Q. 2. (a) Define heat capacity and state its SI unit. [2]
(b) Why is the base of a cooking pan generally made thick ? [2]
(c) A solid of mass 50g at 150° C is placed in 100 g of water at 11° C, when the final temperature recorded is 20°C. Find the specific heat capacity of the solid. [2]
(Specific heat capacity of water = 4.2 j/g° C)

Q. 6. (a) (i) How is the transference of heat energy by radiation prevented in a calorimeter?
(ii) You have a choice of the three metals A, B and C, of specific heat capacities 900 jkg^{-1} $°C^{-1}$, 380 Jkg^{-1} $°C^{-1}$ and 460 Jkg^{-1} $°C^{-1}$ respectively to make a calorimeter. Which material will you select ? Justify your answer. [3]

(b) Calculate the mass of ice needed to cool 150g of water contained in a calorimeter of mass 50g at 32°C such that the final temperature is 5°C. [3]
Specific heat capacity of calorimeter = 0.4 J/g°C
Specific heat capacity of water = 4.2 J/g°C
Latent heat capacity of ice = 330 J/g

(c) (iii) Name two factors on which the heat energy liberated by a body depends. [1]

2016

Q. 1. (d) Calculate the mass of ice required to lower the temperature of 300g of water at 40°C to water at 0°C. [2]
(Specific latent heat of ice = 336 J/g, Specific heat capacity of water = 4.2 J/g°C).

(e) What do you understand by the following statements : [2]
(i) The heat capacity of the body is 60 JK^{-1}.
(ii) The specific heat capacity of lead is 130 $Jkg^{-1}K^{-1}$.

Q. 2. (a) State two factors upon which the heat absorbed by a body depends. [2]

Q. 6. (a) (i) What is the principle of method of mixtures ?
(ii) What is the other name given to it ?
(iii) Name the law on which the principle is based. [3]

(b) Some ice is heated at a constant rate, and its temperature is recorded after every few seconds, till steam is formed at 100°C. Draw a temperature time graph to represent the change. Label the two phase changes in your graph. [3]

(c) A copper vessel of mass 100g contains 150 g of water at 50°C. How much ice is needed to cool it to 5°C ? [4]
Given : Specific heat capacity of copper $= 0.4\ Jg^{-1}\ °C^{-1}$.
Specific heat capacity of water $= 4.2\ J\ g^{-1}\ °C^{-1}$.
Specific latent heat of fusion of ice $= 336\ Jg^{-1}$.

2015

Q. 4. (a) Rishi is surprised when he sees water boiling at 115°C in a container. Give reasons as to why water can boil at the above temperature. [2]

Q. 9. (a) (ii) Which property of water makes it an effective coolant ? [1]

(b) (i) Water in lakes and ponds do not freeze at once in cold countries. Give a reason in support of your answer.
(ii) What is the principle of Calorimetry?
(iii) Name the law on which this principle is based.
(iv) State the effect of an increase of impurities on the melting point of ice. [4]

(c) A refrigerator converts 100 g of water at 20° C to ice at – 10° C in 35 minutes. Calculate the average rate of heat extraction in terms of watts.
Given : Specific heat capacity of ice = 2.1 $J\ g^{-10}°C^{-1}$
Specific heat capacity of water = 4.2 $J\ g^{-10}°C^{-1}$
Specific Latent heat of fusion of ice = 336 $J\ g^{-1}$ [4]

CHAPTER 12

Radioactivity

2025

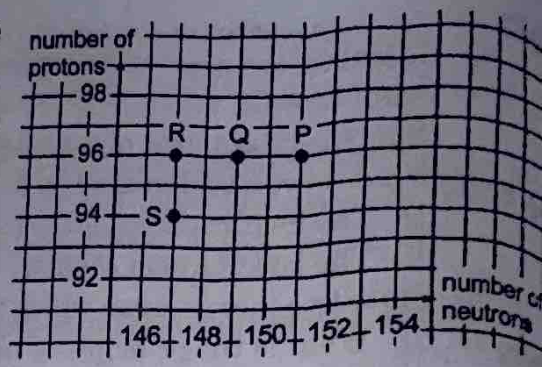
Q. 1. Choose the correct answer to the question from the given options. (Do not copy the question write the correct answer only.)

(xiii) A radioactive element P emits one α-particle and transforms to a new element Q. Wha will be the position of the element Q in the periodic table ? [

(a) One group to the left of P (b) One group to the right of P
(c) Two groups to the right of P (d) Two groups to the left of P

Q. 2. (i) Complete the following by choosing the correct answer from the bracket :
(f) The nuclear radiation with lowest ionizing power is _____ [α/β/γ].

Q. 3. (vii) Curium is a radioactive element with the symbol $^{247}_{96}Cm$ named in honour of Madam Curie. The graph of number of protons vs number of neutrons for some elements are shown below : [3]

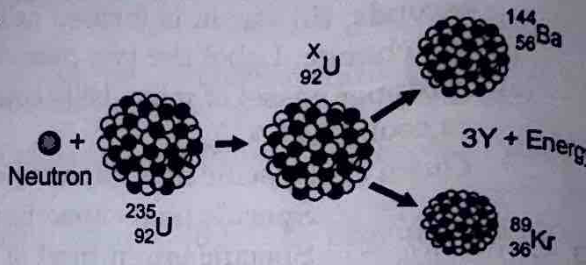


(a) Which point on the graph indicates the element Cm ?

(b) Which point on the graph indicates daughter nucleus after Cm undergoes radioactive decay of 1 α followed by 2β ?

(c) State the mass number of the daughter nucleus.

Q. 8. (ii) Study the diagram given below and answer the questions that follow : [3]



(a) Name the process depicted in the diagram.

(b) What is the value of X ?

(c) Identify Y, the missing product of the reaction.

2024

Q. 1. Choose the correct answers to the questions from the given options. (Do not copy th questions, write the correct answers only.)

(iv) A radioactive nucleus containing 128 nucleons emits a β-particle. After β-emission th number of nucleons present in the nucleus will be : [1

(a) 128 (b) 129

(c) 124 (d) 127

(xiii) A radioactive element is placed in an evacuated chamber. Then the rate of radioactiv decay will : [1

(a) Decrease (b) Increase

(c) Remain unchanged (d) Depend on the surrounding temperature

Q. 2. (i) (a) In the following atoms, which one is a radioisotope? Give one use of this isotope O^{16}, C^{14}, N^{14}, He^4 [1½

Q. 3. (v) Copy and complete the nuclear reaction by filling in the blanks. [2

$$_{92}U^{235} + {}_0n^1 \longrightarrow {}_{56}Ba^{\cdots\cdots} + \ldots.Kr^{92} + 3\ {}_0n^1$$

Q. 7. (ii) (a) Complete the following radioactive reaction :

$$\underline{\quad}X \rightarrow \underline{\quad}Y + {}^4_2He \rightarrow {}^{234}_{91}Z + {}^0_{-1}e$$

(b) Uranium is available in two forms U-235 and U-238. Which of the two isotopes o uranium is more fissionable? [3

23

1. Choose the correct answer to the question from the given options. (Do not copy the question write the correct answer only.)

(iv) Which of the following radiations suffer maximum deflection in a magnetic field ? [1

(a) Alpha radiations (b) Beta radiations

(c) Gamma radiations (d) X-radiations

(v) How is the radioactivity of a radio isotope affected if it undergoes a chemical change ? Give a reason for your answer. [2

Q. 7. (ii) (a) Complete the following nuclear changes :

$$^{238}_{92}P \rightarrow \overset{\cdots\cdots}{\cdots\cdots}Q + {}^{4}_{2}He \rightarrow \overset{\cdots\cdots}{\cdots\cdots}R + {}^{0}_{-1}e$$

(b) Name the nuclear radiation which has the highest ionizing power. [3]

Q. 8. (ii) (a) Which nuclear radiation will travel undeviated in an electric field ?

(b) How can one stop the radiations escaping from a nuclear reactor in a nuclear power plant ?

(c) Name one internal source of backgrounds radiations. [3]

2022

Q. 1. Choose the correct answers to the questions from the given options. (Do not copy the question. Write the correct answer only.)

(ix) The heaviest nuclear radiation is : [1]

(a) x-radiation (b) α-radiation

(c) γ-radiation (d) β-radiation

(x) To study the age of excavated material of archaeological significance we study the rate of decay of an isotope of : [1]

(a) Uranium (b) Cobalt

(c) Carbon (d) Chlorine

Q. 4. (iii) (a) What is nuclear energy?

(b) After emission of a nuclear radiation, the atomic number of the daughter nucleus increases by 1. Identify the nuclear radiation.

(c) Write a nuclear reaction indicating the nuclear change mentioned in (b).

(d) What is the special name given to the parent and daughter nucleus when this radiation is emitted? [4]

Q. 5. (iii) (b) Complete and rewrite the following nuclear reaction by filling the blanks. [2

$$\overset{235}{\cdots\cdots}U \rightarrow \overset{\cdots\cdots}{90}Th + {}^{4}_{2}He$$

Q. 6. (ii) A certain beam of ? particles, ? particles and ?-radiations travel through a region electric field produced between two oppositely charged parallel plates A(+) and B(–). [

(a) Which of the above three has the maximum speed?

(b) Which one deviates the most from its original path?

(c) Which one does not deviate at all when passing through a region of electric magnetic field?

2020

Q. 4. (d) A nucleus ${}_{84}X^{202}$ of an element emits an alpha particle followed by a beta particle. final nucleus is ${}_{a}Y^{b}$. Find a and b.

Q.10. (b) (i) Differentiate between nuclear fusion and nuclear fission.

(ii) State one safety precaution in the disposal of nuclear waste.

(c) An atomic nucleus A is composed of 84 protons and 128 neutrons. The nucleus A e an alpha particle and is transformed into a nucleus B.

(i) What is the composition of B ?

(ii) The nucleus B emits a beta particle and is transformed into a nucleus C. is the composition of C ?

(iii) What is mass number of the nucleus A ?

(iv) Does the composition of C change if it emits gamma radiations ?

2019

Q. 2. (a) An electromagnetic radiation is used for photography in fog.

(i) Identify the radiation.

(ii) Why is this radiation mentioned by you, ideal for this purpose?

Is it possible for a hydrogen ($_1^1H$) nucleus to emit an alpha particle ? Give a reason for your answer.

Q. 4. (d) (i) Why is a nuclear fusion reaction called a thermo nuclear reaction ? [2]

(ii) Complete the reaction : [2]

$$^3He_2 + {}^2H_1 \longrightarrow {}^4He_2 + \ldots\ldots\ldots + Energy$$

Q.10. (b) (i) Define nuclear fission.

(ii) Rewrite and complete the following nuclear reaction by filling in the atomic number of Ba and mass number of Kr : [3]

$$^{235}_{92}U + {}^1_0n \longrightarrow {}^{144}_{\ldots\ldots}Ba + {}^{\ldots\ldots}_{36}Kr + 3{}^1_0n + Energy$$

2018

Q.3. (c) (i) What do you understand by the term nuclear fusion?

(ii) Nuclear power plants use nuclear fission reaction to produce electricity. What is the advantage of producing electricity by fusion reaction?

Q.4. (d) (i) What are isobars? [2]

(ii) Give one example of isobars.

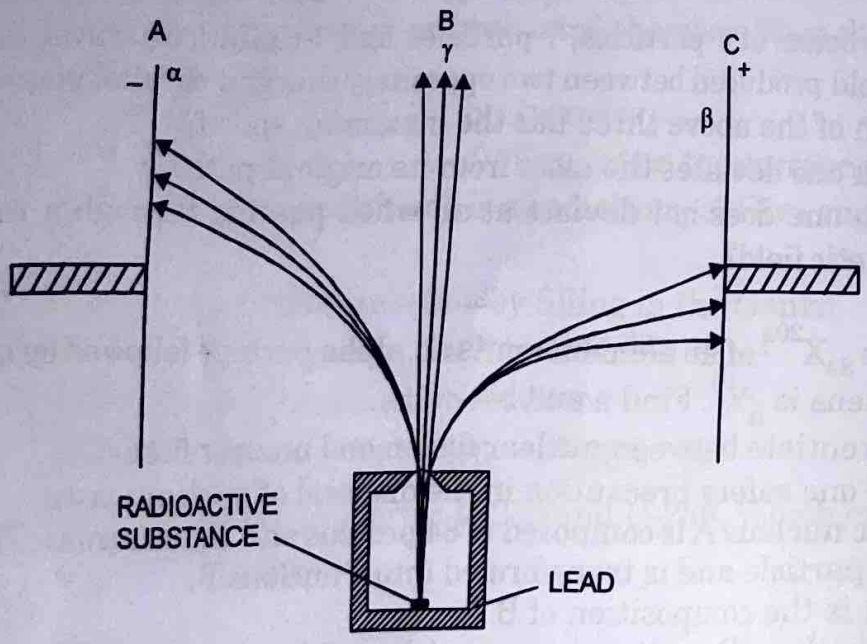
Q.10. (b) The ore of Uranium found in nature contains $_{92}U^{238}$ and $_{92}U^{235}$. Although both the isotopes are fissionable, it is found out experimentally that one of the two isotopes is more easily fissionable. [2]

(i) Name the isotope of Uranium which is easily fissionable. [3]

(ii) Give a reason for your answer.

(iii) Write a nuclear reaction when Uranium 238 emits an alpha particle to form a Thorium (Th) nucleus.

(c) Radiations given out from a source when subjected to an electric field in a direction perpendicular to their path are shown below in the diagram. The arrows show the path of the radiation A, B and C. Answer the following questions in terms of A, B and C. [4]



(i) Name the radiation B which is unaffected by the electrostatic field.

(ii) Why does the radiation C deflect more than A ?

(iii) Which among the three causes the least biological damage externally ?

(iv) Name the radiation which is used in carbon dating.

2017

Q.4. (e) When does the nucleus of an atom tend to be radioactive ? [2]

Q. 5. (b) (iii) Name the process used for

Q. 6. (c) (i) Name the radiations which are absorbed by greenhouse gases in the atmosphere.

(ii) A radiation X is focused by a particular device on the bulb of a thermometer and mercury in the thermometer shows a rapid increase. Name the radiation X. [3]

2016

Q. 4. (b) An element ${}_{Z}S^{A}$ decays to ${}_{85}R^{222}$ after emitting 2 α particles and 1β particle. Find the atomic number and atomic mass of the element S. [2]

(c) A radioactive substance is oxidized. Will there be any change in a nature of its radioactivity ? Give a reason for your answer. [2]

Q.10. (a) Arrange α, β and γ rays in ascending order with respect to their :

(i) Penetrating power.

(ii) Ionising power.

(iii) Biological effect.

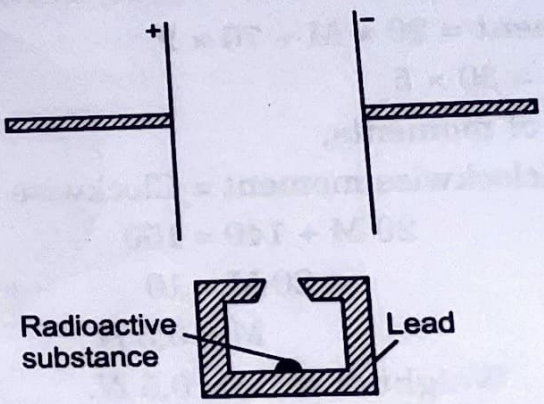
(c) (i) Represent the change in the nucleus of a radioactive element when a particle emitted.

(ii) What is the name given to elements with same mass number and differ atomic number ?

(iii) Under which conditions does the nucleus of an atom tend to be radioactive ?

2015

Q. 10. (b) (i) Complete the diagram as given above by drawing the deflection of radioa radiations in an electric field.



(ii) State any two precautions to be taken while handling radioactive substan

(c) An atomic nucleus A is composed of 84 protons and 128 neutrons.

(i) The nucleus A emits an alpha particle and is transformed into nucleus B the composition of nucleus B ?

(ii) The nucleus B emits a beta particle and is transformed into a nucleus C the composition of nucleus C ?

(iii) Does the composition of nucleus C change if it emits gamma radiation